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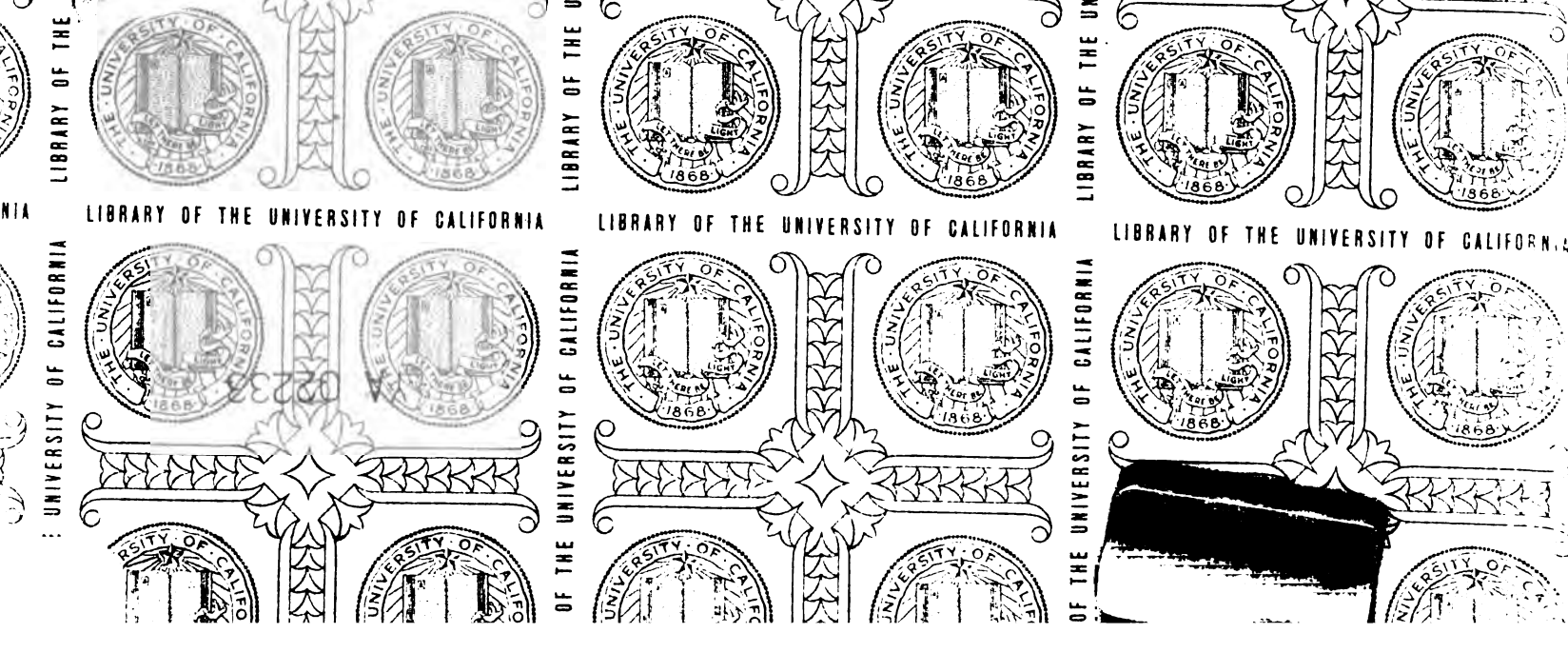

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REPORT BOOK FOR MINING ENGINEERS:

BY

A. G. CHARLETON, M.E.,

Associate of the Royal School of Mines; Member of the North of England Institute of Mining Engineers; Member of the American Institute of Mining Engineers; and Member of the Institution of Mining and Metallurgy; Author of The Choice of Coarse and Fine Crushing Machinery and Processes of Ore-treatment (Trans. the Federated Inst. of Mining Engineers).

Consulting Engineer:

The Exploring and Gold Mining Association, Limited. | **The Prospectors of Matabeleland, Limited, South Africa.**

FIRST EDITION.

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London:
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1895.

TN272
C5

This blank form of Report is designed to enable mine purchasers or mine owners to obtain a comprehensive report upon properties they wish to either acquire or sell.

As stated in the Preface, it is hoped that it will be found suggestive and useful to mining and business men, presenting, in a concise form, a brief outline of information which it is necessary to have, in order to obtain a proper idea of the value of a mining-property.

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DASHWOOD HOUSE, 9, NEW BROAD STREET, LONDON. E.C.

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CHARLETON'S REPORT BOOK

FOR

Mining Engineers.

PREFACE.

IN publishing this pocket-book, the Author desires to address a few words of explanation to the public and to the profession, in regard to its scope and the use to which it is intended to be put.

Its compilation is the outcome of some fifteen years' experience, gained by him in mine inspection work and mine management in various districts in different parts of the world, including Germany, Bohemia, France, Canada, the United States, India and Australia; his idea being to endeavour to supply a want he has often himself felt, viz.: a systematic method upon which to base reports, that will save the engineer an unnecessary waste of labour and time, and enable him to preserve a record of his work in a condensed and handy form for subsequent reference so that the salient points can be picked out in a few minutes without the necessity of wading through pages of MS., typewritten documents, or notes.

The work as it stands merely *suggests* broad lines for the engineer to follow, whilst leaving ample scope for the exercise of that most important factor in success—his personal judgment.

It will be the Author's endeavour, however, to keep pace with improvements and developments, and in future editions he hopes to add to the pocket-book, and to obviate any omissions or imperfections which may be found in this, the original edition.

With this object, he invites, and will be glad to receive, any suggestions both from strangers and from his numerous professional friends at home and abroad; his desire being, to make the book thoroughly *practical*, and, as far as it is possible to be, universally applicable.

The ground it covers is of course familiar enough to "mining men" generally, but it often happens that for want of following a fixed system of enquiry, even an experienced engineer sent out to make a report on a property is apt to overlook some important point, and only discovers the oversight when, having left the spot, it is too late to rectify it. It is hoped that by employing this system, the delay and inconvenience which may be thus caused when a report comes to be written up and handed in, will be avoided.

Further, it is the Author's hope that the book will serve as a protection and guide to the Directors of Mining Companies and purchasers of mining property, in indicating those technical points which are most essential to ascertain, in order to properly estimate the value of mines they may think of acquiring.

Even with the most accurate and searching questions, it is obvious, however, that the value of the replies must largely depend on the intelligence, capacity and good faith of the person answering them.

The best and only real safeguard against risk is to engage on the spot thoroughly reliable, competent, and experienced men to make such reports, whose reputation is a sufficient guarantee that their work will be thoroughly done, and to employ a first class firm of Consulting Engineers to advise the purchasers in London.

Most of the failures and losses in mining that are not attributable to defective company constitution or financial mismanagement, may be traced to neglect of these necessary precautions, though the very best men never profess to be infallible upon mere matters of opinion. A clear line of distinction should however be drawn between errors of judgment, and errors in facts.

The book will have fulfilled the Author's purpose if it tends to diminish the more ordinary legitimate risks which are day by day becoming less and less, as mining is carried on upon a more practical business basis, and scientific *methods* aiming at industrial development take the place of rule of thumb and mere haphazard speculation, given sound, unimpeachable management upon strictly modern lines.

After all there is scarcely any form of industrial or business undertaking, the prospects of which can be so clearly gauged by the ordinary shareholder as mining, well conducted mines nowadays furnishing such an amplitude of information, that there is no lack of data for determining the particulars in which a badly managed mine fails.

In conclusion, it should be pointed out, that it may be impossible in many cases to fill in answers to every question in the report book, and the completeness with which this can be done will entirely depend on the position of the property, its state of development, and local surrounding conditions.

More or less complete answers, ought, however, to be forthcoming under all the more important headings in every case.

A. G. CHARLETON, M.E.

DASHWOOD HOUSE, LONDON,
November, 1895.

NOTE.—Arrangements can be made for receiving a telegraphic reply to any question or series of questions embraced by the report by arranging a code-word with the reporting engineer, meaning: Telegraph reply to (page number so and so, or such and such question) in Charleton's Report Book.

GENERAL NOTES.

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There are NINE points which it is of primary importance to know in order to fully determine the present value of a Mine as an industrial going concern, as distinguished from a mere speculative venture :—

1. The ore in sight and its gross value.
2. The loss in the process of reduction.
3. The cost of plant, roads, &c.
4. The cost of mine development.
5. The cost of mining, milling, management, royalties, transport, &c.
6. The time required to develop and exhaust the property.
7. The time required to bring the property into working order.
8. The cost of forming the Company.
9. The value of the machinery when the property is exhausted. (This can be taken generally as being *nil* at the end of eleven years.)

The practical application of such information is fully explained in an article in the "LONDON MINING JOURNAL," *February 9th*, 1895, *of which an abstract is given on pp.* 8 *and* 9 ; *and if the state of development of the property admits of it, these questions should be satisfactorily answered, to enable the capitalist to form an opinion of the price he should pay for the property, and the amount at which it ought to be capitalised, to return adequate interest, upon the proposed investment.*

GENERALLY speaking, the man who has been fortunate enough to discover a gold reef or other metalliferous vein, hearing of the high prices asked and paid for similar properties, is apt to exaggerate *its real value*, which has to be considered apart, and distinguished from any prospective or speculative value it may possess.

The difficulties to be met by a mining engineer employed by a purchaser or company, after he has made an estimate of the "ore in sight," and "probable reserves" upon which profits have to be calculated, are not unfrequently accentuated by the vendors themselves failing to see that they must allow the purchasers of *an undeveloped* property a comparatively high rate of interest for the risk that is incurred in its promotion and purchase, whilst on the other hand, if the rate of interest they demand is excessive, the purchasers may stand in their own light and lose a good property. The risk is an element which it is difficult to calculate when arranging the rate of interest that the purchaser may be reasonably allowed.

Probably the best plan is for the engineer to estimate the value of the property at several rates of interest, and submit them for consideration, so as to enable his employers to negociate the matter for themselves on terms they consider suitable.

If, for example, the vendors own a property estimated to contain 704,000 tons of ore, running on an average 12 dwts. in gold to the ton, and the following points have been determined:—

1st—That there will be a loss of 2 dwts. per ton in treatment
2nd—That the time necessary to bring the property into a full producing condition is two years.
3rd—That the cost of plant will be £15,000.
4th—That the cost of mining development will be £10,000.
5th—That the cost of surface works, roads, etc., will be £5,740.
6th—That the cost of mining, milling, management, transport, royalties, etc., will be £1 10s. per ton.
7th—That the cost of forming a company will be about £6,000.
8th—That the time required to develop and exhaust the property will be 11 years.
9th—That the value of the machinery should be taken as *nil* at the end of eleven years.

the valuer is practically in possession of the necessary facts to estimate the value of the property, and he only requires to know the interest the vendor will allow the purchasers.

Should they be allowed 20 per cent. per annum upon their purchase-money, and to redeem the capital at 2½ per cent. per annum, when the profits are deferred two years, the vendor would receive £51,329 11s. 10d. for his mine; but should the purchasers look for 40 per cent. on their purchase-money, the capital being redeemed and the profits deferred, as in the former case, the vendor would only get £1 3s. for it.

In order, therefore, to do justice to both parties, the first thing to ascertain is the annuity or annual profits which the mine may be reasonably expected to yield.

Valuing the ore which is assumed to contain 12 dwts. of fine gold at £2 10s. 10½d. per ton, we have :—

704,000 tons at £2 10s. 10½d. .. .. =			£1,791,680 0 0
Less the value of 2 dwts. lost in reduction .. .. =	£298,613 6 8		
„ cost of mining, milling, management, royalties, etc., on 704,000 tons at £1 10s. 0d. per ton =	£1,056,000 0 0		
		1,354,613 0 0	
Net estimated profit			£437,066 13 4

and $\frac{437,066 \cdot 13.4}{11}$ = £39,733·6·8 the annuity or annual profit to be derived during the whole period of 11 years.

The present value of £1 per annum so as to allow the purchasers 20 per cent. upon their purchase-money, and to redeem their capital at 2½ per cent. per annum when the profits are deferred two years, is 2·3,112947.

Therefore, £39,733,333 × 2·3,112947 = the present gross value of the mine, viz.		£91,835 8 10
From which deduct cost of plant	£15,000 0 0	
„ „ „ „ „ development	10,000 0 0	
„ „ „ „ „ surface works	5,740 0 0	
„ „ „ „ „ company formation	6,000 0 0	
	36,740 0 0	
„ „ „ compound interest on £36,740 for 2 years at 5 per cent... .. .. =	3,765 17 0	
		40,505 17 0
Net value of property		£51,329 11 10

But the present value of £1 per annum when the purchasers are allowed 40 per cent. per annum, and to redeem the capital at 2½ per cent. per annum, profits being deferred two years, is 1·01947.

Therefore £39,733 6 8 × 1·01947 makes the present gross value of the mine only	£40,507 0 0
From which deduct cost of plant, development etc., as above	£40,505 17 0
Net value of property	£ 1 3 0

Under conditions such as those above stated it is evident therefore that the vendor could not allow the purchasers 40% interest on their purchase money, and 20% would generally be considered too low a rate to allow upon a mine abroad.

Allowing, however, 30% per annum to the purchasers, its net present value would work out at £18,204 3s., the price which might probably be accepted as reasonable by both sides.

The above illustrations merely serve to indicate the broad lines upon which a proper valuation ought to be based, as the figures will vary of course, *ad infinitum* with every modification in the factors that must be taken into consideration.

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SKELETON MINING REPORT.

REPORT ON THE

GROUP OF MINES.

BY

INSTRUCTIONS.

FILL IN ON OPPOSITE PAGE.—(1) Address of Writer;

(2) Date of Report;

(3) Name and Address of person for whom the Report is made.

(4) Names of separate Claims or Leases comprised in the property.

(5) Designation of Mine, Group of Claims or Leases, collectively.

To .....

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Sir,

I beg to hand you the following Report upon the .....

known as the .....

INSTRUCTIONS p. 2.

Give the name, length, width and aggregate area of the Property, specifying the size of each Claim or Lease.

NOTES.—A Lode Claim properly located is usually a parallelogram or square.

In the United States a full claim is 1,500 × 600 feet, or 20·7 acres = 900,000 sq. feet.
In Rhodesia a claim is ... ... 150 × 400 feet ... ... = 60,000 „

} A Lode "pegged out" within a Claim can be followed on all its spurs, dips and angles to any depth.

In the Transvaal a claim is ... 109 × 109 yards ... ... = 10,000 sq. metres.
In W. Australia an ordinary quartz claim is 75 × 400 feet ... ... = 30,000 sq. feet.

} A Lode "pegged out" within a Claim cannot be followed outside the limits of its surface boundary lines.

Do. a reward claim varies from 100 × 400 feet up to 500 × 400 feet according to distance from existing workings.

An acre contains 43,560 sq. feet. A square mile contains 640 acres. 220 × 198 feet = 1 acre.

Boundaries of claims should be so marked that they can be easily traced by a surveyor, the distance and bearing (direction) from one corner to a permanent or fixed landmark being recorded.

NAMES OF CLAIMS OR LEASES, AREA AND DATE OF LOCATION.

The ..... *is* ..... *ft. long by* ..... *ft. wide, located* ..... *18* .....

The ..... *is* ..... *ft. long by* ..... *ft. wide, located* ..... *18* .....

The ..... *is* ..... *ft. long by* ..... *ft. wide, located* ..... *18* .....

The ..... *is* ..... *ft. long by* ..... *ft. wide, located* *18*

The ..... *is* ..... *ft. long by* ..... *ft. wide, located* ..... *18* .....

The ..... *is* ..... *ft. long by* ..... *ft. wide, located* *18*

The ..... *is* ..... *ft. long by* ..... *ft. wide, located* ..... *18* .....

Total area of the property about ..... *acres.*

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INSTRUCTIONS p. 3.

Fill in name of the property and the mining district or gold field where it is situated; name of the county, territory or province, and the state or colony to which it belongs; distance from and name of nearest railway station; also position, distance from and name of nearest important town and means of communication with it, so that the exact location of the mine can be found on any good map of the district.

GEOGRAPHY.

This Property, known as the :— . . . . . *is situated in the*

Mining District in

and is

distant . . . . . *miles in a* . . . . . *direction from*

. . . . . *the nearest Railway Station.*

The nearest important Town . . . . . *is distant* . . . . *miles in a*

. . . . . *direction, and is reached by* . . . . . .

. . . . . *over* . . . . . .

. . . . . .

INSTRUCTIONS p. 4.

Give the history of the neighbouring Properties and any important Mines on the field up to date, as regards more especially—

(1) Quantity of stone crushed.
(2) Value of the ore.
(3) Profits or losses.
(4) The first Claims located and worked.
(5) Changes that may have taken place in the character of the ores from surface in depth.

NOTE.—Such information can generally be gleaned from prospectors, local newspapers and official reports, or Government records.

Historical information in regard to every mining district is worth collecting and publishing. Early mining failures do not necessarily detract from the present merits of an old "field," and if frankly told often lead to an investigation, which shows how they can be overcome.

HISTORICAL.

INSTRUCTIONS p. 5.

Fill in Form on opposite page.

It often happens that a mining camp is reached partly by main road and partly by trail or bush track, in which case the lengths of both sections should be given. The elevation can be roughly ascertained by aneroid measurement.

The blank lines at the bottom of the opposite page are to be filled in with estimates of the cost of building new roads, improving existing ones, and constructing cable or tram-lines on the property itself.

ACCESSIBILITY.

From ..... *Station on the* .....

..... *Railroad this property is reached over* .....

miles of ..... *waggon road, and* ..... *miles in length, a total*

of ..... *miles from the railway station.*

The elevation of the Mine is ..... *feet higher than the railroad station,*

and ..... *feet above sea level.*

INSTRUCTIONS p. 6.

It should be ascertained whether there is any dispute for the possession of the property, or litigation pending; also whether there is any debt or incumbrance against the property. These can generally be found by consulting Government Official records, and the authority for this information should be stated.

TITLES.

Title to the whole or ..... *of the property is vested by* { *location, lease, or patent,* } *in* .....

the owners .....

who have conveyed their rights by power of attorney to .....

There is ..... *dispute or counter claim to the present owners' possession.*

There is ..... *indebtedness or incumbrance against the property amounting to* .....

due.

This page is filled in on information from .....

INSTRUCTIONS p. 7.

The most developed vein of the group should be described on this page by filling up the blank spaces with the information called for. If more than one vein has been "opened up" similar information for each vein should be interpolated, and several pages are left blank to be filled in with a description of the peculiar characteristics of the vein, or such other information concerning it as may be of importance.

GENERAL CHARACTERISTICS OF VEIN.

The ..... Vein has the following characteristics:

Strike .....

Dip ..... degrees from horizontal:

Width varying from ..... *feet;*

Outcrop ..... *traceable for a distance of ..... feet;*

Hanging wall .....

Foot wall .....

Vein filling .....

Oxidised ore extends down about ..... *feet.*

Average width of pay streak ..... *Length of ore shoots* .....

Average width of any specially rich portion ..... Developed at the ..... ft. level.

REESF L... OF THE

INSTRUCTIONS p. 8.

The nature of the country rocks enclosing the vein on the "foot" and "hanging-wall" sides must be stated, and the character, course, and dip of the "dikes," if any, that occur in the neighbourhood of the veins should be given here. Also the general geological and topographical features of the neighbourhood, and any local peculiarities in the geology of the district, that have been found by experience to favourably affect the value of the ore deposits or the reverse, and the names of any rivers, or creeks near the mine.

NOTE.—The time spent on studying the formation of the veins and the dike system (if there is one) in the neighbourhood is well repaid, as a knowledge of the geology of the country frequently supplies the key which leads the possessor to discover the "bonanza ore-bodies" of the district.

GEOLOGY.

The country rock on the hanging wall of the ..... Vein is: .....

.....

On the footwall it is .....

..... *dikes of ..... occur.*

The country surrounding is composed of .....

and is drained by ..... creeks, tributaries of the ..... river.

INSTRUCTIONS p. 9.

The number and size of the shafts, drives, rises, winzes, and open cuts by which the veins on each property are developed, should be entered under this heading, and the extra blank pages filled in if one is insufficient to cover them all.

It is very important that all development work should be accurately measured and located with reference to the boundaries of the claim, and the position of the vein should be shown on an accompanying map.

The numbers of the various open cuts, etc., will be found by reference to the plans and sections on pages

DEVELOPMENTS.

On the ..... *Claim there are:*

Specify Number.

(1) *Shaft (vertical or underlie)* ..... *feet deep.*
No. 1. No. 2. No. 3.

(2) *Open Cuts* ..... *feet in length.*
No. 1. No. 2. No. 3. No. 4.

(3) *Tunnels or Adits* ..... *feet in length.*
No. 1. No. 2. No. 3. No. 4. No. 5.

(4) *Drives* ..... *feet in length.*
No. 1. No. 2. No. 3. No. 4. No. 5.

(5) *Rises* ..... *feet in length.*
No. 1. No. 2. No. 3. No. 4. No. 5.

(6) *Winzes* ..... *feet in length.*
No. 1. No. 2. No. 3. No. 4. No. 5.

(7) *Stopes* .....

..... *from which* ..... *fathoms have been removed altogether.*

INSTRUCTIONS p. 10.

The quantity, quality and cost of all the mining supplies likely to be needed in future operations ought to be ascertained, and such information should be carefully and correctly given, as it is of the utmost importance for close estimates to have such data to figure upon.

MINING FACILITIES.

FUEL—There is a ..... *supply of* ..... *Timber.*

Cordwood costs ..... *per* { *ton* / *cord* } *delivered at the Mine.*

Coal costs ..... *,, ton ,, ,, ,, ,,*

Charcoal costs ..... *,, bushel ,, ,, ,, ,,*

Coke costs ..... *,, ,, ,, ,, ,, ,,*

MINING TIMBER AND LUMBER—Timber for stull and tunnel-sets ranging from ..... *to* ..... *inches in diameter can be delivered f.o.b. the Works at a cost of from* ..... *to* ..... *per running foot.*

Lagging poles cost ..... *per length of* ..... *feet. Lumber costs* ..... *per thousand at* .....

.....

The character, quality and quantity of water available for steam and domestic purposes and the distance of the supply from the Mine should be given.

If there is any water available for power purposes within reasonable distance of the Mine its flow in cubic feet and fall obtainable at a good Mill site, length of pipe, ditch or flume necessary and cost of constructing same per yard should be given.

For calculating the amount of water flowing in an open stream, the following method will be found sufficiently accurate:—

Find the height of head by aneroid. Measure depth of water at from six to twelve points across the stream at equal distances apart, add all the depths in feet together, and divide by the number of measurements taken. This gives the average depth of the stream which, multiplied by its width, gives its area in cross-section multiply this by its velocity of flow in feet per minute and you get the cubic feet discharged. The velocity may be found by laying off 100 feet along the bank, throwing a float into the middle and noting the time it takes to be carried down, striking the average of a number of trials. Dividing the distance traversed by the number of minutes taken gives the surface velocity in feet per minute. As the flow at surface is more rapid than at the bottom and sides, the difference being about 8 feet per cent., it is better to measure a distance of 120 feet for the float, reckoning it as 100.

These measurements should be made at a season when the stream is low.

WATER.

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FOR DOMESTIC PURPOSES there is .....

..... *water within* ..... *of the mine.*

FOR STEAM PURPOSES there is .....

..... *water within* ..... *of the mine.*

FOR POWER PURPOSES there is a flow of .....

cubic feet of water within ..... *of the mine, with a fall of*

..... *feet at a suitable site for a plant, by conveying it by a* .....

..... *or* ..... *feet in length.*

Such a ditch could be built for ..... *per rod.*

INSTRUCTIONS p. 12.

Prices at the nearest large town (giving its name) and the railway and other freight to the Mine are to be entered here. Also whether farm produce is raised in abundance or otherwise in the neighbourhood of the property.

NOTE.—This information should be given with care and as much accuracy as possible, as cost of living is an important factor in operating a Mine.

SUPPLIES.—Hardware, &c., can be purchased at the following prices with freight of ..... per lb. added at .....

Farm Produce.—Hay costs ..... per ton. Oats or Corn costs ..... per bushel.

Flour costs from ..... to ..... per lb.

Butter ,, ... ,, ... ,,

Potatoes ,, ... ,, ... ,,

Beef ,, ... ,, ... ,,

Mutton ,, ... ,, ... ,,

Canned Goods ,, ... ,, ... ,,

Groceries ,, ... ,, ... ,,

Beer and Spirits ,, ... ,, ... *per qt.*

INSTRUCTIONS p. 13.

The cost of labour is one of the largest items entering into the calculations of profit or loss of a mining enterprise, and should be set down fully and correctly.

LABOUR.

Mine Manager's salary ranges from ..... *to* .....
Shift Bosses' wages range from ... ... *to* ...
Timber Men's wages range from ... . *to* .....
Miners' daily wages range from .. .. *to* .....
Truckers' ,, ,, ... *to* ....
Mill Manager's salary ranges from ..... *to* ....
Amalgamators' daily wages range from ..... *to* ... ...
Mill Hands' ,, ,, ... *to* .....

Stone Breakers', Feeders' and Boys' daily wages range from ... ... *to* ...
Carpenters' daily wages range from ..... *to* ....
Blacksmiths' ,, ,, ... *to* .....
Blacksmith's help ,, ,, ... *to* .....
Engine Drivers' ,, ,, ... *to* ....
Native Labour costs ... ... *to* .....
,, *Miners* ... ... *to* ... ...
,, *Mill Hands* ... ... *to* .....

Four-horse Teams and Teamster Wages range from ..... *to* ...

CONTRACT WORK.

Cross-cut Tunnels ... ... *in the clear, can be run on Contract for* ... . *per foot.*
Drives on Veins, ,, ,, ,, ,, ... ,,
Rises on Vein, ,, ,, ,, ,, ... ,,
Winzes on Vein, ,, ,, ,, ,, ... ,,
Incline Shaft on Vein ,, ,, *sunk on* ,, ... ,,
Vertical Shaft ,, ,, ,, ,, ... ,,
Stoping costs ... ... *per cubic, or running fathom. Drilling costs* ... ... *per foot.*

INSTRUCTIONS p. 14.

The value of assays and even of milling-tests on a larger scale, entirely depends on the *accuracy* of the *sampling*, which is largely governed by the method employed. In this connection the following papers may be consulted for information.

(1) Sampling Ores Without Machinery, vol. xx, p. 155, Trans-American Institute of Mining Engineers.

(2) Important Points in Sampling, vol. lii, p. 264, *New York Mining Journal*, Sept. 15th, 1891.

(3) Notes on Sampling, vol. liv., p. 156, *New York Mining Journal*, August 13th, 1892.

(4) The Sampling and Measurement of ore-bodies in Mine Examinations, vol. 59, *New York Mining Journal*, March 2nd, 9th and 16th, 1895.

(5) Mine-Salting, by W. McDemott, vol. iii, p. 108, Trans. the Inst. of Mining and Metallurgy.

In calculating the tonnage and value of ore "in sight" for a conservative estimate, it is generally necessary that *three* sides of the ore body should be exposed by the developments, but this is not always absolutely required. If the vein is regular an ore-chute cut by several levels may admit of close calculation as to tonnage and value above a given level. Two sides of an ore body may be sufficient for this calculation, allowing one-third discount off when the ore-chute is at all irregular. The extent of the developments by which this ore is placed in sight should be fully stated. The average length, breadth and thickness of an ore body in feet, multiplied by each other will give its cubic contents in feet. Cubic feet divided by 10 or 12 for a sulphide ore, and 13 to 18 for an oxidised ore, gives the approximate tonnage *in place*. In dumps 22 to 24 cubic feet of oxidised ore, nd 15 to 18 of sulphide should be allowed per ton.

ORE TONNAGE IN SIGHT AND VALUE.

In the..... { *Mine* / *Claim*

there are about..... *tons of ore in sight, having an average value of about*.....

per ton in..... *; the ore is exposed by the* .....

.....

.....

.....

.....

The following list will assist the Miner in the foregoing calculations:—

Name of Rock.	Average Weight per Cubic Feet.	
Granite and Porphyry	170 lbs. in place ...	97 lbs. broken.
Gneiss	168 „ ...	96 „
Greenstone and Trap	187 „ ...	107 „
Limestone	168 „ ...	96 „
Slate	175 „ ...	95 „
Quartz	165 „ ...	94 „
Landstone	151 „ ...	86 „

WEIGHT OF TIMBER.

Pine, 1,000 feet, B.M., measures perfectly dry, 1,860 lbs. Green Timber usually weights $\frac{1}{5}$ to $\frac{1}{4}$ more than dry, and tolerably seasoned ordinary building Timber $\frac{1}{6}$ more than dry.

The following table given by Mr. ROBERT HUNT, F.R.S., shows the weight in lbs. per cubic foot of various Metals and Ores:—

"To find the weight of Ore per square fathom in a vein, multiply the number opposite the Ore by the number of cubic feet in a square fathom of the vein at a given thickness." To find the cubic feet multiply the average thickness of the Ore in inches by 3.

METALS AND ORES.	Weight per cubic foot, lbs.
GOLD	1230·00
SILVER	750·00
„ chloride	287·50
COPPER, native	525·00
„ vitreous	543·75
„ pyrites	259·37
„ purple	312·50
„ grey	296·87
„ red	375·00
„ malachite	250·00
TIN, oxide	406·75
„ sulphide	268·75

METALS AND ORES.	Weight per cubic foot. lbs.
LEAD, native	709·37
„ sulphide (galena)	468·75
„ carbonate	403·75
ZINC, blende	250·00
„ red oxide	337·50
„ carbonate	268·75
ANTIMONY, native	412·50
„ sulphide	281·25
„ oxide	345·25
MANGANESE	212·50
„ di oxide	300·00
„ wad	231·25
„ psilomelan	250·00

METALS AND ORES.	Weight per cubic foot. lbs.
NICKEL, arsenical	450·25
„ sulphide	281·25
„ glance	381·25
COBALT, white	400·00
IRON, native	456·25
„ pyrites	500·00
„ arsenical	581·25
„ hæmatite (brown)	225·00
URANIUM, pitch blende	404·73
BARYTA, heavy spar	268·75
LIME, calcspar	156·25
FLUORSPAR	196·25
SILICA	162·50

ORE TONNAGE IN SIGHT AND VALUE—*continued.*

ORE TONNAGE IN SIGHT AND VALUE—*continued.*

INSTRUCTIONS p. 15.

The description of the samples must clearly denote the character of the ore, width of "pay streak," and the point from which it was taken.

If the vein is wide and carries different grades of ore, samples must be taken of the various classes, and their average value should agree with the value of the general average sample.

Specimens, though they may be characteristic of parts of the vein, do not furnish proper data upon which to calculate the average value of the ore.

Gold calculated at £4 3s. 4d. per oz.
Silver „ „ per oz.
General average value per ton.

ASSAYS OR PAN TESTS (See Supplementary Table) p. 80.

Samples taken by ..... *and*

assayed by ..... *ran as follows:—*

Nos.	DESCRIPTION.	GOLD PER TON. ozs. dwts. grs.	SILVER. PER TON. ozs. dwts. grs.
1			
2			
3			
4			
5			
6			
7			
8			

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ASSAYS - *continued.*

Nos.	DESCRIPTION.	GOLD PER TON.	SILVER. PER TON.
		ozs. dwts. grs.	ozs. dwts. grs.
9			
10			
11			
12			
13			
14			
15			

ASSAYS—*continued.*

Nos.	DESCRIPTION.	GOLD PER TON.			SILVER. PER TON.		
		ozs.	dwts.	grs.	ozs.	dwts.	grs.
16							
17							
18							
19							
20							
21							
22							

ASSAYS—*continued.*

Nos.	DESCRIPTION.	GOLD PER TON.			SILVER. OZ. PER TON.		
		ozs.	dwts.	grs.	ozs.	dwts.	grs.
23							
24							
25							
26							
27							
28							
29							

ASSAYS—*continued.*

Nos.	DESCRIPTION.	GOLD PER TON. ozs.	dwts.	grs.	SILVER. PER TON. ozs.	dwts.	grs.
30							
31							
32							
33							
34							
35							
36							

ASSAYS—*continued.*

Nos.	DESCRIPTION.	GOLD. PER TON. ozs. dwts. grs.	SILVER. OZ. PER TON. ozs. dwts. grs.
37			
38			
39			
40			
41			
42			
43			

ASSAYS—*continued.*

Nos.	DESCRIPTION.	GOLD. PER TON. ozs. dwts. grs.	SILVER PER TON. ozs. dwts. grs.
44			
45			
46			
47			
48			
49			
50			

Gold calculated at £4 3s. 4d. per oz.
Silver calculated at ..... per oz.

General Average .....ozs. .....dwts. .....grs. per Ton.

INSTRUCTIONS p. 16.

To be filled in from actual Mill statements, the accuracy of which must be attested.

SHIPMENTS AND PROCEEDS.

There have been ..... *tons of first-class ore shipped to the* .....
Works, which netted ..... *per ton. Also* ..... *tons of second-class ore to the* .....
Works, which netted ..... *per ton.*

	£	s.	d.	
Estimated cost of Developing this ore	.....			*per ton.*
„ „ „ *Mining* „	.....			„
Cost of Waggon or tram-line transport	.....			„
Cost of railway transport	.....			„
Cost of milling or other treatment	.....			„
General Expenses	.....			„
Total Cost	.....			„

INSTRUCTIONS p. 17.

The character and cost of the "plant" necessary for dealing with the Ores developed, above and below water-level, to be entered opposite.

If the Mine is sufficiently developed the Ores should be sampled by practical milling tests, when the necessary facilities for doing so can be obtained in the neighbourhood. Having settled upon the method to be employed and the capacity of the proposed "plant," tenders should be obtained from different makers, and their offers should be separately entered on page 17.

The usual particulars required for figuring on tenders for "plant" will be found in the instructions sub-joined.

PARTICULARS REQUIRED FOR PLANT TENDERS.

(1) **Description** of ore to be treated, and, if known, the chemical and mineralogical composition of same.

(2) **Quantity** of ore to be crushed in a given time, say per diem, stating the length of the working day.

(3) **Saving.** What percentage of *metal or mineral is required to be saved,* and to what extent does it need to be concentrated.

(4) **Plans.** Send if possible general plan of ground or of mill, set out with contour lines, 3 feet apart, vertically, with cross sections and levels, shewing direction from which the ores arrives, and in which the tailings are to leave the mill.

(5) **Water.** State quantity of clean water available per minute or per hour, and shew on plan the direction in which it arrives and can be discharged from the mill.

(6) **Power.** State whether steam, water or other power is available, how much, and shew position on general plan.

(7) **Buildings.** Are these to be all iron or part iron and brick or stone and woodwork?

(8) **Samples.** Send with enquiry, if possible, a small average sample of the crude ore (about 5 cwt.) and later on from 1 to 5 tons of ore to test with an experimental plant, before making definite plans and submitting tenders.

The returns obtained should be stated in ounces of gold and silver (not ounces of bullion) and units or percentage of metal.

(9) **Remarks.**

REDUCTION PLANT.

The Ores of this property are suitable for reduction by the .....

.....*process. A reduction plant of this character of*..... *tons daily capacity will cost*

erected and ready to run..... *Estimated by*.....

as follows: .....

.....

.....

.....

.....

INSTRUCTIONS p. 18.

On the supposition that the reduction plant described on page 17 is erected and in operation, the blank form opposite must be filled in. An increase in the quantity milled generally lowers the average yield per ton that previously obtained.

Liberal estimates must be made upon all items for the first year or two, as these generally run higher at first than after the Works have been in operation some time, when everything is properly systematized.

ESTIMATE OF PROFIT WITH PLANT RECOMMENDED ON PAGE 17.

	£	s.	d.
.....*tons per day of assay value of*.....*per ton* - -			
	£	s.	d.
Loss in treatment.....*per cent.* - - - - -			
Cost of Mining.....*tons @ £*.....*per ton* -			
Cost of transport of.....*tons @ £*.....*per ton* -			
Cost of reduction of.....*tons @ £*.....*per ton* -			
All other items of expense, say £.....*per ton* - -			
Total Cost -			
Net profit per day - - - - -			
Net profit per year - - - - -			

INSTRUCTIONS p. 19.

As it is impossible to frame a form suitable for all conditions under which the owners might be willing to part with their property, the proposition they are prepared to make may be entered on the blank pages that follow. In this connection it is important to know the total amount at which they propose to capitalize the property (*i e.* the total nominal capital if it is proposed to form a Company), and the total working capital considered necessary to prove, develop, and place the mine in a producing condition corresponding with the capacity of the existing or contemplated reduction works connected with it. The owners of *unproductive* mining property should be willing to bond such on reasonable terms, or part with an interest in it to persons who will undertake its systematic development.

TERMS OF SALE.

The parties ..... *will sell for* .....

payable in .....*instalments of* ..... *each. First* .....

..... *; second* ..... *months after* .....

.....

or they will lease and bond it for ..... *under the following conditions :—*

.....

.....

.....

INSTRUCTIONS p. 20.

On the opposite page a Sketch Plan Map of the claim or group of claims or mine should be made on a scale that will admit, if possible, of showing the entire property, The paper is blocked out in squares of one-eighth of an inch, each one of which may be made to represent any number of feet considered necessary.

Plan of [illegible]

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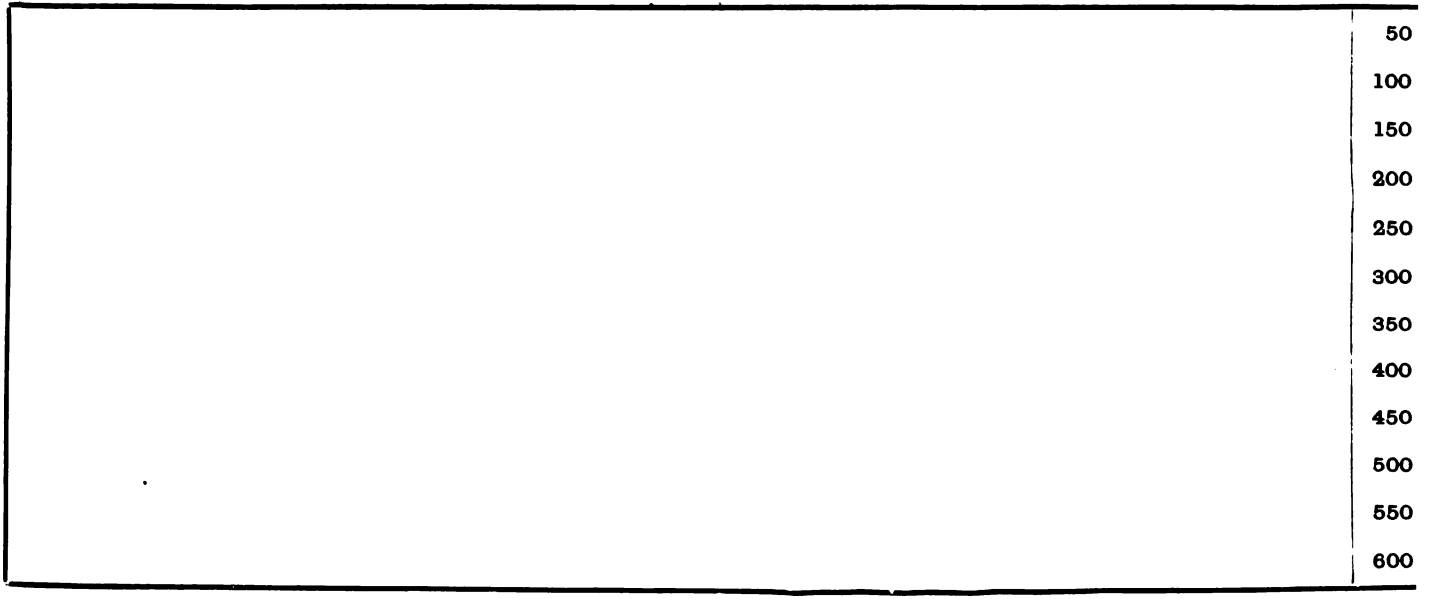
Draw an outline showing Surface of Vein.

NO. 1.—LONGITUDINAL SECTION OF VEIN.....MINE.

Start the highest point on vein from this line, 50 feet to square.

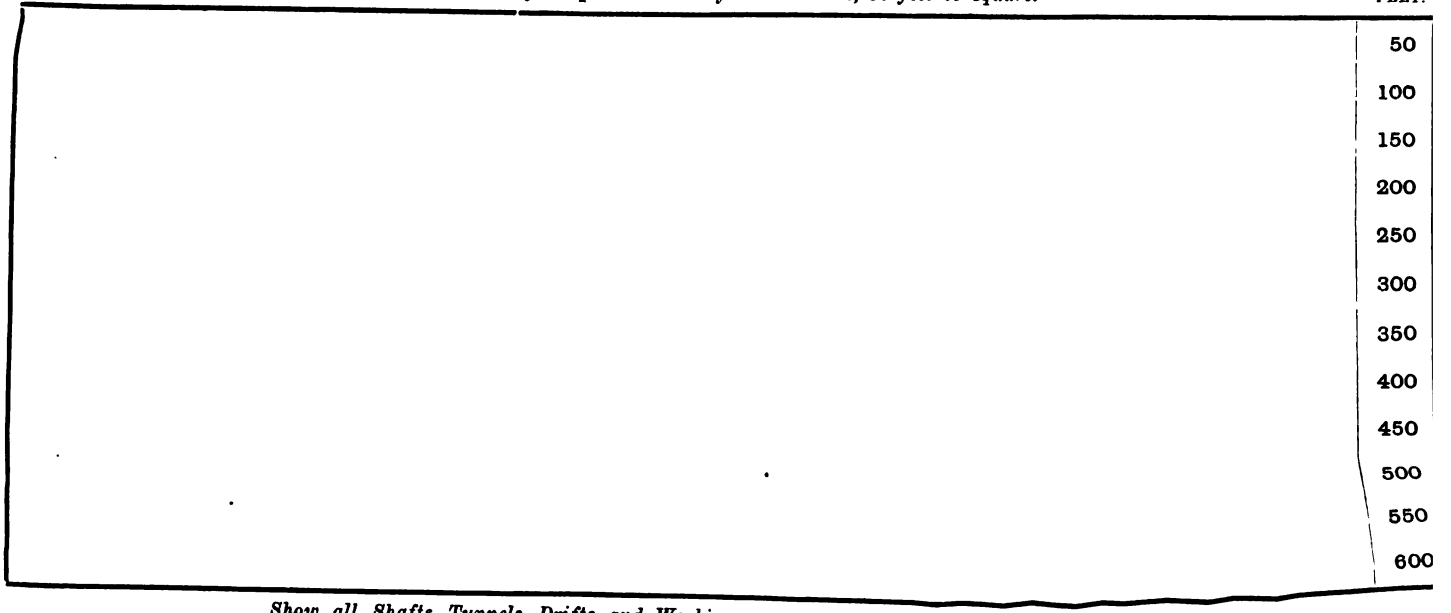


Show all Shafts, Tunnels, Drifts and Workings.

SCALE—50 FEET TO SQUARE.

LONGITUDINAL SECTION OF VEIN..... MINE.

Start the highest point on vein from this line, 50 feet to square.



Show all Shafts, Tunnels, Drifts and Workings.
Draw an outline showing Surface of Vein.

SCALE: 50 FEET TO SQUARE.

INSTRUCTIONS p. 21.

This page is for entering all items of travelling expenses connected with the examination.

SUMMARY OF TRAVELLING AND OTHER EXPENSES INCIDENTAL TO EXAMINATION.

189.....		£	s.	d.

SUMMARY OF TRAVELLING AND OTHER EXPENSES INCIDENTAL TO EXAMINATION—*continued.*

189.....		£	s.	d.

SUMMARY OF TRAVELLING AND OTHER EXPENSES INCIDENTAL TO EXAMINATION—*continued.*

189.....	£	s.	d.

SUMMARY OF TRAVELLING AND OTHER EXPENSES INCIDENTAL TO EXAMINATION—*continued.*

189	£	s.	d.

SUMMARY OF TRAVELLING AND OTHER EXPENSES INCIDENTAL TO EXAMINATION—*continued.*

189.....	£	s.	d.

INSTRUCTIONS p. 22.

Under this head should be given a list and description of Maps, Assay Certificates, Reports and Letters, Newspaper Clippings. Photos, &c., sent with the report.

All these go to make up evidence necessary to investigate the merits of the proposition.

ENCLOSURES.

Herewith please find enclosed :—

Maps .....

Assays .....

Report by .....

Letter by .....

Newspaper Clippings from .....

Photographs .....

INSTRUCTIONS p. 23.

The date and time of departure and arrival of Steamers, Trains or Coaches from London to the Station nearest the Mine are to be entered here, also distance, time and conveyance necessary to reach the property from the nearest Railway Station. This is important to persons comtemplating visiting the property.

If there is not a daily Train it should be stated when it runs.

DIRECTIONS AND TIME NECESSARY TO REACH THE PROPERTY.

189....

DATE.	TIME.	
		Leave ..... *via* .....
		Arrive ..... ,, ...
		Leave ..... ,,
		Arrive ..... ,,
		Leave ..... ,,
		Arrive ..... ,,
		Leave ..... ,, ...
		Arrive ..... ,,

DIRECTIONS AND TIME NECESSARY TO REACH THE PROPERTY—*continued.*

189.....

DATE.	TIME.	
.....	.....	*Leave*..... *via*.....
.....	.....	*Arrive*..... ,, ...
.....	.....	*Leave*..... ,, ...
.....	.....	*Arrive*..... ,, ...
.....		*From this, the nearest Railway Station the distance to the Mines* (..... *miles*)

is made by.....

.....

Total time required for this trip.....

INSTRUCTIONS pp. 24—79.

In conclusion, after answering any of the following "Questions" that require reply, the writer of this report is expected to fill out the succeeding blank pages with his own words and ideas, and make such recommendations as will suggest the proper mode of dealing with the property.

The owners of a property should be willing to give bonds with deeds in escrow, to parties willing to undertake a stipulated amount of development upon a property, in order to prove it in depth or extend developments, so as to properly demonstrate its merits and actual value.

QUESTIONS

Requiring consideration to meet special circumstances, from which a *judicious* selection should be made in each particular case, and answered independently under this heading, if not embodied in the foregoing General Report.

1. *State the experience and standing of the man who makes the report?* - - - - - - - - -

2. *How many veins have been proved on the property? What is the nature of each vein? is it a true fissure vein, a zone of altered rock, a contact vein, a bedded deposit, a gash vein, stock-work, or irregular deposit* - -

3. *Is it fairly regular or irregular in width?* - - -

4. *Has it a "selvage" or "parting" of any kind and of what character?* - - - - - -

QUESTIONS—*continued.*

5. *What is the nature of the "hanging" and "footwalls"* - .....

6. *Is it good holding-ground on both walls?* - - - .....

7. *Is the ore separated from the "country rock" by a "lode formation" or matrix of any kind?* - - - .....

8. *Is it easy or hard driving ground, and having regard to the character and width of vein, and the nature of the walls, what width can be most profitable removed?* - .....

9. *Is there a well defined or irregular "pay streak" in the lode, or must it be removed from wall to wall?* - - .....

10 *Is it easier driving in the lode or alongside of it?* - - .....

11. *Is the outcrop of the vein exposed at surface?* - - - .....

QUESTIONS—*continued.*

12. *For what length can it be traced, at one or more points, without a break?* - - - - - - - -

13. *Is the ore free-milling or otherwise?* - - - - -

14. *Is the ore of a distinctly acid or basic character?* - -

15. *Is the gold coarse or fine, or both coarse and fine, partly or entirely "free," mechanically or chemically combined, or unamalgamable (rusty)?* - - - - - -

16. *Is there likely to be much float gold, or gold lost in solution in milling the stone?* - - - - - - -

17. *What are the silver minerals found in the ore?* - -

18. *How are the gold and silver distributed in the ore?* see TABLES I and II - - - - - - - -

19. *If requisite give a chemical analysis of the ore and fluxes for smelting it?* - - - - - - - -

20 *State if there is any constituent present in the ore in such proportion as to depreciate the commercial value of the product, and to what extent?* - - - - - -

21. *Is the physical character of the ore, or its mineralogical composition likely to prejudically affect its reduction, or the extraction of the metals it contains?** - -

* In the case of a gold-ore, large losses may occur, (*a*) through the excessively fine state of division of the gold particles, (*b*) through the clayey or talcose character of the gangue producing an excessive quantity of slime and preventing proper contact with the amalgamated surface of the plates, which is liable to happen if there is much limonite (hydrated oxide of iron) present; heavy—spar (sulphate of baryta) and oxides of manganese produce much the same effect. Pyrites, more particularly partially decomposed copper-pyrites, zinc blend and galena, tend to flour the mercury and cause loss, and any soluble sulphates of copper, resulting from decomposition, may be reduced by the iron of the mortar to metallic copper, which is readily amalgamated, and this cupriferous mercury has the very undesirable property of taking up fine particles of iron, which also results in "flouring" the amalgam present; native antimony, native bismuth and their sulphides and arsenical pyrites are even worse in this respect. (*c*) A coating of silica, silicate of iron, or copper oxide may also render the gold partly unamalgamable. (*d*) The chemical combination of gold with other elements may influence the results, notably when gold and silver are alloyed in certain proportions, when gold is alloyed with bismuth (maldonite and bismuthaurite) when accompanied by tellurides of gold, and of gold and silver, or when selenides of gold are present (*e*) Gold which has absorbed sulphur from sulphuretted hydrogen or sulphide of ammonium, though presenting a bright surface, also refuses to amalgamate unless annealed.

QUESTIONS—*continued.*

22. *Are the character of the ore the characteristics of the lode, and the surrounding geological conditions the same in the adjoining properties, and are they common to the district as a whole?* - - - - - -

23. *Does the ore change below water-level?* - - - -

24. *What percentage of Sulphurets does the stone carry?* -

25. *What is their nature?* - - - - - - - -

26. *Does the back of the lode carry a "gossan cap," if so for what distance?* - - - - - - - -

27. *Are any particular minerals generally found in association with the pay ore* - - - - - - - -

28. *What is the character of the quartz, has it a kindly appearance or the reverse. (The one being generally a dark greyish-blue or brown, semi-transparent resinous looking stone, or white laminated and separated by thin talc, graphitic or chloritic partings, frequently iron or copper stained, and carrying galena pyrites or blende. The other a white vitreous quartz or opaque milky vein stone with but little mineral or metal visible. Specimen quartz is frequently however white and clouded* - - - - - - - - - -

29. *What is the lode stuff or matrix, i.e., "formation" (Australian)?* - - - - - - - -

30. *Have alterations in the nature of the adjacent rock, or in the strike or dip of the veins been found to influence their ore bearing qualities?* - - - - - -

31. *How do any existing dikes or cross courses influence the lodes of the district* - - - - - - -

32. *Have "slikensides" or "indicators" been observed, and does "ore occur against ore" in parallel veins that have been already "proved"* - - - - - -

33. *Is the ore regular, or occurring in shoots, pockets or pipes; what are the length of the breaks occurring between the ore bodies and what are the number, size, and average value of these latter?* - - - - - - -

34. *What is the "pitch" of the ore shoots?* - - - - -

35. *Is the lode-stuff of a kindly nature or the reverse* - -

QUESTIONS—*continued.*

36. *Are any of the existing proved shoots widening or narrowing in length with increased depth?* - - - -

37. *Can the vein be worked with open gunnicies, or does it need timbering or packing, if the latter how can it best be obtained?* - - - - - - - - -

38. *Can the vein be tapped by cross-cut tunnels or adit levels, and at what depth, stating their length at different depths?* - - - - - - - - -

39. *Can the lode be developed best by vertical or underlie shafts?*

40. *How much ore has been removed from the mine?* - -

41. *What is the amount and value of the "ore in sight" (blocked out) and the estimated amount of "probable reserves"?* - - - - - - - -

QUESTIONS—*continued.*

42. *What is the approximate area of ground stoped up to date of report and of the "reserves" ready for stoping?* -

43. *What is the proportion of "developed" to "undeveloped" ground?* - - - - - - - - -

44. *How much ore is on the dumps and what is its value?* -

45. *What quantity of ore can be produced at present per diem?*

46. *With how many men?* - - - - - - - -

47. *What length of shafts and levels are timbered?* - -

48. *What is the nature and cost of the timbering, walling, or other means of support used?* - - - - -

QUESTIONS—*continued.*

49. *What is the distance of the main levels apart, and what method is employed for removing the ore?* - - -

50. *What other properties are there situated on the same line of reef?* - - - - - - - - - -

51. *How does the ore compare in grade and character with the ore in neighbouring mines?* - - - - -

52. *Are there any local surface indications to guide the prospector, such as peculiar form of ground, colour, nature of decomposed outcrop (gossan), ordinary springs, mineral springs, indicative plants, altered vegetation, lode lights, or burrows of animals shoad-stones, old workings, slag-heaps, ruins, old records, or names of places?* - - - - - - - -

QUESTIONS—*continued.*

53. *How many cubic feet of ore (broken and in place) are reckoned to the ton?* - - - - - - -

54. *What is the average amount of moisture in the ore?* -

55. *What is the distance of the mine from the nearest waggon road?* - - - - - - - - - -

56. *What is the distance to the nearest sea port?* - - -

57. *Is there any water in the mine?* - - - - -

58. *At what depth struck?* - - - - - - - -

59. *What quantity of water does the mine make per diem at present, and what is the probability of its increasing or diminishing?* - - - - - - - -

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QUESTIONS—*continued.*

69. *How many drills can the present compressor run, and at what pressure?* - - - - - - - -

70. *Can diamond drills be profitably employed for prospecting underground or on surface?* - - - - -

71. *What explosives are used, and what is the average monthly consumption of these and other mine supplies enumerated below?* - - - - - - - -

72. *What is the cost of drill-steel per lb.?* - - - -

73. „ *fuze per dozen coils?* - - - -

74. „ *candles per box or lb.?* - - -

75. „ *caps* „ *?* - - - -

QUESTIONS—*continued.*

76. *What is the cost of cotton waste per lb.?* - - - .....

77. „ *colza oil per drum?* - - - - .....

78. „ *dynamite per case or lb.?* - - - .....

79. „ *powder per lb. or keg?* - - - .....

80. *Is there timber actually on the property, or near by?* - .....

81. *What is the timber in the district most suitable for mining fuel and purposes of construction, and to what size does it run?* - - - - - - - - .....

82. *What progress can be made per week in sinking shafts and winzes, rises, and driving levels and cross-cuts?* - - .....

83. *What are the designations, dimensions and divisions of the different shafts and for what purposes are they employed?* - - - - - - - - - .....

84. *What are their relative positions and distances apart?* - .....

85. *What machinery is there at the mine?* - - - - .....

86. *What money has been spent on it, and upon "development" work?* - - - - - - - - - - .....

87. *What time is estimated to erect the entire plant?* - - .....

88. *What is the estimated cost of the entire plant?* - - .....

89. *Is the neighbourhood of the mine healthy or unhealthy, and what are the most prevalent complaints?* - - - .....

QUESTIONS—*continued.*

90. *Which are the healthy and which the unhealthy seasons* - .....

91. *Are cyclones prevalent?* - - - - - - .....

92. *What is the mean summer temperature and winter temperature, and what is the average rainfall of the district ?* .....

93. *To what extent are the river levels and water supply affected by it?* - - - - - - - - - .....

94. *Which are the rainy, and which the hot or cold months ?* - .....

95. *Is the rainfall equally distributed or generally irregular ?* .....

96. *Is there a heavy snowfall, if so for how long does it stop or interfere with work?* - - - - - - - .....

97. *Are white ants or other insect pests common ?* - - - .....

QUESTIONS—*continued.*

98. *Is labour abundant, locally or otherwise, and of what class?* .....

99. *Are there any provisions in the local mining regulations, or laws of the country, that affect the value or acquisition of the properties, favourably or otherwise?* - .....

100. *State if there any local taxes on imported machinery, etc. that affect mining* - - - - - - - - .....

101. *State if there are any private royalties chargeable on the property or process employed* - - - - .....

102. *What are the terms and labour conditions under which the properties are held from the Government?* - - - .....

103. *Are there public crushing mills or reduction works in the neighbourhood?* - - - - - - - - .....

104. *What is the distance of the mine from the nearest reduction works?* - - - - - - - -

105. *What are their charges?* - - - - - - -

106. *Has a mill site been secured, under what title is it held, and how is it situated relative to the mine and water supply, does it possess a good fall and suitable ground for foundations, and is there a "water-right" and ample dumping ground in connection with it?* -

107. *Is it requisite to ship any part of the ore for treatment to a distance, if so, how much and where?* - - -

108. *What prices are offered for ore in the nearest and cheapest markets?* - - - - - - - -

109. *If a copper mine, describe the ore, and its mode of occurrence, whether or not it carries gold or silver, and the quantity of the copper produced per annum* - .....

110. *The quantity of crude ore treated* - - - - - .....

111. *The percentage of copper therein contained* - - - .....

112. *The quantity of concentrates produced, and their average tenor and value* - - - - - - - - .....

113. *The loss of copper per ton of crude ore mined in concentrating and smelting* - - - - - - - .....

114. *The quantity of ingot copper produced in lbs. per annum up to date* - - - - - - - - - .....

115. *Its average value per lb.* - - - - - - - .....

116. *The cost per ton of ore, and per lb. of copper produced of mining, surface expenses, transport, crushing and concentrating, freight, smelting, marketing, etc.* - - .....

117. *The net profit or loss per ton of ore treated, shown by results or estimated* - - - - - - - - .....

118. *If a lead zinc mine describe the ore and its mode of occurrence, and whether or not it contains silver or gold as well* - - - - - - - - - .....

119. *The quantity of crude ore treated, and the percentage of galend, blende, or other minerals therein contained* - .....

120 *The quantity of concentrates of each class produced, and their average tenor and value* - - - - -

121. *The loss of mineral per ton of crude ore of each class mined in concentrating, and the loss of metal in smelting* -

122. *The quantity of lead and spelter produced* - - -

123. *The average value of these metals at current quotations* -

124. *The cost per ton of mining, surface expenses, transport, crushing and concentrating, freight, smelting, marketing, etc., calculated both on the crude ore mined, and on the quantity of concentrates produced* - - -

125. *The net profit or loss per ton of ore treated, actually shown or estimated* - - - - - -

126. *The present value of the ore per ton on the spot, having regard to freight and reduction charges?* - -

127. *State the world's average production, supply, consumption, and market price of the metal during the last few years, and what has been the production of the district in which the mine is situated?* - - - - -

128. *Where has the world's supply been chiefly obtained and disposed of and what is the present estimated stock of metal on hand?* - - - - - - - -

129. *Is there likely to be a rise or fall in the price of the metal due to increased consumption or demand, or other cause?* - - - - - - - - -

130. *If the ore can be enriched by hand-picking, state to what extent this is practicable, giving the value of the various grades produced* - - - - - - - -

131. *Ascertain by tests to what size the ore should be crushed to give the best commercial results with the highest possible extraction* - - - - - - - -

132. *State whether this reduction can be effected in one operation or requires to be done gradually in one or more operations* - - - - - - - - -

133. *If a stamp battery is included in the purchase, state the number and kind of motors used, and estimated power required to drive the machinery? see* TABLE III.

QUESTIONS– *continued.*

(1) *The nature of the battery site* - - - - .....

(2) *The number of stamps* - - - - - .....

(3) *The weight of the stamps in lbs.* - - - .....

(4) *The drop in inches* - - - - - - .....

(5) *The number of drops per minute* - - - .....

(6) *The order of fall* - - - - - - .....

(7) *The height of discharge* - - - - - .....

(8) *The type of mortar used* - - - - - .....

(9) *The inside dimensions of the mortar* - - - .....

(10) *The duty of the stamps in tons crushed per head in 24 hours* - - - - - - - - .....

(11) *The material used for shoes and dies see* TABLE IV. .....

(12) *The wear and cost of the material of which the shoes and dies are made see* TABLE IV. - - .....

(13) *The material of the stems, cams and tappets* - .....

(14) *The proportion of stems, etc., broken-* - - .....

(15) *The quantity of water used by the battery per minute in gallons or cubic feet* - - - .....

(16) *The quality of the water supply available for battery purposes and boilers, whether hard, soft, or impure?* - - - - - - - - .....

(17) *The amount of ore per cubic foot of water discharged from the battery in the pulp* - - .....

(18) *The quantity of water needed (if any) to supplement the battery supply* - - - .....

(19) *The kind of screens used, whether Russia iron, bronze, tin, or iron-cloth, round holes or slot punched, size, wear and number of holes, see* TABLES V, V[a] *and* VI - - - - - .....

(20) *The dimensions of the screen opening (inside frame) and whether vertical or inclined* - - .....

(21) *The size of the battery apron and sluices, their slope in degrees or in inches per running foot, and the number of wells, traps, etc., used* - - .....

(22) *Whether "plates" are used inside or outside the battery, and their size* - - - - - .....

(23) *Whether the "coppers" are plain, electro-plated or Muntz metal* - - - - - - .....

(24) *Whether patent cams or any other special appliances are used* - - - - - .....

(25) *Whether automatic or hand feeding is used, if the former the kind of feeder* - - - -

(26) *If rock breakers are used, state their kind and number* - - - - - - - -

(27) *If the ore is concentrated, give the number, kind and capacity of such concentrators, and the cost of concentration per ton of crude ore, and of concentrates produced, showing the cost of renewals and repairs* - - - - -

(28) *State the number and kind of pans, barrels or other grinding machines used, showing the cost of renewals and repairs* - - - - -

(29) *If the ore is ground in pans fill in* TABLE VII. -

(30) *State the chemicals employed (if any)* - -

(31) *State the cost of milling, sub-divided as per* TABLE VIII. - - - - - - - -

(32) *State the number of mill hands employed to run the mill part or full time, and their rates of pay as per* TABLE IX. - - - - -

(33) *State the cost of the mill and its accessory plant in £ s. d. per stamp* - - - - -

(34) *State the comparative results obtained at different mills in the same district, as per* TABLE X. - - - - - - - -

134. *State the relative per centages of gold and silver saved in milling, see* TABLE XI. - - - - - -

135. *State the actual gold obtained by trial crushing by the different mill appliances? see* TABLE XII. - - -

136. *Give the retort percentage of the amalgam?* - - -

137. *Give the weight and percentage of amalgam and bullion obtained per ton of ore treated? see* TABLE XIII. - -

138. *State the quantity of mercury required to charge the whole mill and how it is distributed?* - - - -

139. *State the nature and percentage of sulphurets in the concentrates?* - - - - - - - -

QUESTIONS—*continued.*

140. *State the tenor and value of the concentrates per ton :*

ozs. dwt. grs. £ s. d.

(*a*) *In gold*.....

ozs. dwt. grs. £ s. d.

(*b*) *In silver*.....

lbs. £ s. d.

(*c*) *In other metals*.....

141. *State the loss of free gold in the tailings ?* - - -

142. *State the loss of sulphurets in the tailings ?* - - -

143. *State the loss of mercury in the tailings ?* *see* TABLE XIV.

144. *State the number of tons of ore crushed upon which the foregoing estimates are based ?* - - - -

QUESTIONS—*continued.*

145. *State the date and time the crushing lasted in days and hours?* - - - - - - - - - - .....

146. *State the nature of any sorting or sizing which the ore undergoes, and the various products obtained?* - - .....

147. *If a Huntington Mill is used fill in* TABLE XV. - - .....

148. *If rolls or other crushers are used show the cost of labour and renewal of working parts for operating them in detail?* - - - - - - - - .....

149. *If the ore is roasted, state the number and description of furnaces required, the capacity of each furnace per 24 hours, its fuel consumption, the labour needed to operated it and cost of repairs?* - - - - .....

150. *If the ore is roasted and chloridized, state the percentage of salt used?* - - - - - - - - -

(*a*) *The losses of gold and silver in roasting, and whether traceable to any special constituents of the ore ar other causes* - - - - - -

(*b*) *The size to which the roasted ore was previously crushed* - - - - - - - -

(*c*) *The cost per ton of roasting and chlorination itemized as per* TABLE XVI. *or* TABLE XVII. - - -

151. *State the fineness of the bullion produced per* 1,000? -

152. *State the average cost per ton, method of treatment, and working results of cyanide treatment? see* TABLES XVIII., XIX., XIX[a]., XIX[b]. *and* XIX[c]. - - - -

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153. *State the average cost per ton of lixivation, see* TABLES XX., XX[a]., XXI., XXII., XXIII., XXIV., XXV., XXV[a]., XXV[b]., *and* XXV[c]., *describing the system of treatment adopted?* .....

154. *State the average cost per ton of other methods of treatment if employed? see* TABLES XXVI., XXVI[a]., XXVII., XXVIII., XXIX., XXIX[a]., XXX., XXXI. *and* XXXII., *giving details of the process employed* - - - - .....

155. *State whether selected ores or concentrates are to be dealt with* - - - - - - - - - - .....

156. *State the percentage of metal saved by any of the above processes and the itemized monthly cost? see* TABLE XXXIII. - - - - - - - - - - .....

157. *State the cost of production per ounce of gold, silver, or bullion produced, giving in the latter case its 'fineness'* .....

158. *If more than one process is on trial, fill in* TABLE XXXIV. .....

159. *The question of enlarging existing works should be considered, and what arrangements that can be made to treat ore for outside parties by contract?* - - .....

(*a*) *On tariff* - - - - - - - - .....

(*b*) *By actual purchase* - - - - - .....

160. *If the Company owns smelting works, give a description of the process and the location of the works?* - - - - .....

(*a*) *The description and number of the furnaces and enumerate any other plant employed* - - - .....

(*b*) *The capacity of each furnace per 24 hours and the method of operating it* - - - - - .....

(*c*) *The pressure of the blast employed* - - - -

QUESTIONS—*continued.*

161. *State the contents of the ore and the percentage of extraction of the metals contained in it?* - - - - - -

162 *State the bullion yield per diem and its value?* - - -

163. *State the quantity and kind of other products produced and their value?* - - - - - - - - - - -

164. *State the loss of metal in fume, dust, and slag separately?* - -

165. *State the nature, quantity and cost of fluxes required and procurable?* - - - - - - - -

166. *State the quantity and cost of labour, fuel. water, etc.* -

167. *State the cost of materials for repairs to furnaces, etc.?* -

168. *State the total cost of smelting?* - - - -

Vide TABLE XXXII.

169. *State the average number of men employed* - - - - .....

(1) *In the mine:*

(A) *On wages (day-pay)* - - - - - .....

(B) *On contract* - - - - - - .....

(C) *On tribute-* - - - - - - .....

(2) *In the mill* - - - - - - - - .....

(3) *On the surface* - - - - - - - .....

(4) *On the staff (Manager, Clerk, Assayer, Mine Captain Reduction Officer)* - - - - - - .....

170. *The consumption of coal or wood per diem:*

(1) *At the mine* - - - - - - - .....

(2) *At the mill or other works* - - - - .....

(A) *For steam purposes* - - - - .....

(B) *For roasting or drying ore* - - - - .....

(C) *For smelting* - - - - - - .....

171. *State the consumption of coke or charcoal monthly in bushels:*

(1) *For blacksmith's work* - - - - - .....

(2) *For assaying and melting* - - - - - .....

172. *State the number, kind, size and power of engines and boilers, or water or electric motors in use or likely to be required ?*

173. *State the quantity of water in cubic feet or "miner's inches" used by each motor and the "working head" in feet if hydraulic power is employed ?* - - - - - - - -

174. *State if there is a sufficient supply of water on the property to run the mill or works, the quantity required, and how it can be obtained ?* - - - - - - - - -

175 *State if the water is suitable for drinking and boiler purpose or otherwise, and the nature of any impurities it contains ?* -

176. *State the cost of steam, water, electrical, oil or gas engine, or pneumatic haulage and cable, or animal traction, stating the number of draught animals employed and the cost of their keep*

177. *State the cost and character of exploratory work hitherto done, whether by drives or drills (diamond) ?* - - - -

178. *State separately the amount of exploratory and development work done during the last three years the mine was worked?*

179. *State separately the amount of ore extracted from the mine during the last three years the mine was worked?* - -

180. *State the total quantity of ore sold or treated in the three previous years, separately ?* - - - - - - -

181. *State separately the average assay value of the ore sold or treated in the last three years, and any marked variations in value observed at different levels in the mine, along the course of the main ore shoots ?* - - - -

182. *State the total yield of bullion, its fineness and value in gold and silver or other metals, such as copper and lead, produced in the three previous years, given separately and detailed for the last 12 months?* - - - - - - - -

183. *State the total number of days the mine or works were idle during the three previous years and the cause?* - - - - -

184. *Show if possible the total gross cost of labour employed during the three previous years:*

(A) *At the mine* - - - - - - -

(B) *At the works* - - - - - - -

(C) *On surface* - - - - - - -

185. *Show if possible the total gross cost of supplies and materials of all kinds consumed during the three previous years*:

(A) *At the mine* - - - - - .....

(B) *At the works* - - - - - - .....

(C) *On surface* - - - - - - .....

186. *Show if possible the total gross cost of administration per annum, during the past 3 years, including salaries, rent, taxes, office expenses, insurance, interest, legal and express charges, etc.?*

187. *Show if possible the total average expenditure at the mine and works per annum (including administration), based on the last three year's results; if only one years' results are known fill in* TABLE XXXV.*?* - - - - - - - - .....

188. *State any proposed changes or improvements that can be introduced with a view to cheapen cost in the future?* - - .....

189. *State if possible the total quantity of ore the mine has produced from its commencement or so far as records go back ?* - - .....

190. *State if possible the average yield of the ore throughout and whether it was sold or treated on the spot and by what process or processes ?* - - - - - - - - - .....

191. *State the present average daily output of ore maintainable and the best method of future treatment ?* - - - - - .....

192. *State the approximate quantity of ore on the dumps at the time of the report and its estimated value ?* - - - - .....

193. *State the present estimated cash value of the mine itself based on the actual "ore reserves" in sight, apart from "probable reserves"; estimating these latter separately ?* - - - .....

QUESTIONS—*continued.*

194. *State the present estimated cash value of the underground improvements, shafts, tunnels, drives, etc.?* - - - .....

195. *State the present estimated cash value of the buildings at the mine including engine shed, pit-head framing, shops and offices?* - .....

196. *State the present estimated cash value of the mine machinery, including engines, boilers, pumps, compressors, drills, cars, tools, etc, above and below ground?* - - - - - .....

197. *State the present estimated cash value of mine supplies of all kinds on hand?* - - - - - - - - - .....

198. *State the present estimated cash value of the mill, smelting or other reduction plant and buildings connected therewith, valuing the latter separately?* - - - - - - .....

199. *State the present estimated cash value of mill and surface supplies of all kinds on hand when the valuation is made?* .....

200. *State the present estimated cash value of the surface rights and of any dwellings, offices, etc., erected on the property, not included in the foregoing?* - - - - - - - .....

201. *State the present estimated cash value of machinery, tools and plant of all kinds (except buildings) not directly connected with the mine or mill?* - - - - - - - - .....

202. *State the present estimated gross value of the property and works connected with it valued upon the basis explained in "General Notes?* - - - - - - - - - .....

203. *State the actual net profit on present working?* - - - - .....

204. *State the actual net profit on previous operations?* - - - .....

205. *State the probable net profit on future working per annum?* -

206. *The possibility of supplementing profits from the mine itself by treating ore for outside parties and other available sources of revenue must be carefully considered* - - - -

207. *The sum (if any) set aside or proposed to be set aside out of profits for redemption of capital and depreciation of plant should be stated* - - - - - - - -

208. *State what capitalization the property can reasonably stand on present estimates; so as to allow the purchasers x per cent. interest per annum, redeeming the capital expended in x years?* - - - - - - - - - -

209. *State what working capital is likely to be needed to enable the mine to produce x tons a day?* - - - -

210. *If the mine requires further development before the anticipated profits can be made, state what amount of work will have to be done, what it will cost, and what time will be required to execute it?* - - - - - - - - - -

211. *If the property does not pay, what reason is assigned for it?* -

212. *The state of repair of the plant generally and the condition of the mine underground ought to be stated* - - - - -

213. *Ascertain all liabilities of any kind chargeable against the property* - - - - - - - - - -

214. *Examine titles to mine and mill-sites, water and timber rights and all contracts relating to the undertaking binding on the vendor* - - - - - - - - - -

215 *Maps and plans of the district and of the property, indicating their topographical and geological features, the situation and approaches of the property, position of shafts, mill site, buildings, etc., and plans and sections of the mine on a working scale, showing the area of the claim or lease, its position in regard to adjoining mines and landmarks, the extent of ground worked out, and the trend of the "ore bodies," are in all cases desirable* - - - - - - - -

216. *State your general recommendations and conclusions, and what drawbacks, if any, there are to the property?* - - -

217. *If a placer-mine state whether a shallow "placer," "deep lead," or river-deposit* - - - - - -

(A) *Its area or acreage* - - - - - -

(B) *The value put upon the gravel or cement per cubic yard, and what total quantity the property is estimated to contain, and yield on the average per acre* - - - - - - - -

(C) *What tests have been made to determine its thickness at various points?* - - - - - -

(D) *If such tests have been made, give a plan of the property showing the position of trial pits, borings, etc., and the run and width of any rich "bars," "leads" that may have been proved to exist; distinguishing between "pay" and barren ground, and give a section of the gravel*

QUESTIONS—*continued.*

(E) *What is the character of the gravel, how is the gold distributed in it, and is the latter coarse or fine;* - - - - - - - - -

(F) *State if the deposit contains pipe clay, cement, or large boulders, that would in any way hinder its rapid working* - - - - - -

(G) *What is the thickness of the overburden?* - -

(H) *What is the nature of the bed-rock, rim-rock, or "cap"?* - - - - - - - -

(I) *Show where the lowest point on the claim is situated*

QUESTIONS—*continued.*

(J) *State if this can be connected by a bed-rock tunnel with a good dumping ground?* - - - .....

(K) *What length and "grade" would this tunnel have?* .....

(L) *Is there good and sufficient dump room for tailings?* .....

(M) *What is the length of the season during which the claim can be worked?* - - - - - .....

(N) *What outlay should be estimated for monitors, sluice undercurrents, etc., and what would be the size, weight, cost and number of the former, and the disposition, size, length, grade and cost of the latter* - - - - - - - - - .....

(o) *What is the present and what is the maximum quantity of water available to hydraulic "the banks," what will it cost to deliver per miner's inch, and where can it be obtained from* .....

(p) *What length of ditch, flume and pipe will be required, and what will these cost to build and lay; give a section of the ground to scale, showing the differences of level, and a plan of the line of route?* - - - - - - - - .....

(q) *What size of pipe is estimated to be required, under what head will it deliver the water, and how many "nozzles" will it work during the season (months) to advantage?* - - - - .....

(R) *With the above facilities taking into consideration the thickness, character and position of the gravel, what acreage can be worked out in a season, and at what gross cost per acre?* - -

(S) *What is the duty of a miner's inch in this ground?*

(T) *What staff and labour will be needed to work the property on the scale proposed and at what wages rates?* - - - - - -

(U) *Will it be necessary to build a storage reservoir or brushdams for tailings, and are inverted syphons, hydraulic elevators, or any special appliances required to work the gravel?* - - -

(v) *Up to date, what number of cubic feet of gravel are estimated to have been moved each season, and what has been the gross cost and net profit* -

(w) *Are there any legal or local restrictions upon hydraulic mining in the district* - -

(x) *If a "deep lead" state what system is proposed to work the ground, and whether trouble is likely to be encountered from water; if so, what "pumping plant" will be needed and what will it cost to handle the water?* - - -

(y) *If a "cement claim," what crushing machinery will be required, and what will it cost per ton to crush the cement?* - - - - -

QUESTIONS—*continued.*

(z) *If a "river-claim," can it be worked by dredging, or is it proposed to dam and divert the stream, and what is the estimated outlay for "plant," dams, &c., to carry out this work?* - - -

(AA) *What stock of tools, mercury, etc., will be required to equip the works for carrying on operations on the scale proposed?* - - - -

(BB) *What Capital is needed to thoroughly equip and work the property?* - - - -

NOTE.—Where there is insufficient space opposite an enquiry to answer it fully, it can be filled in on one of the blank pages 131 *et seq.* by repeating the number; noting the page where the answer is given, in line with the question in print.

PAN TESTS (GOLD TABLE).

Weight Washed Gold. 4lb. sample quartz 6lb. ,, gravel	Fineness ·780. Value per oz. $16.12.	Fineness ·830. Value per oz. $17·15.	Fineness ·875. Value per oz. $18·08.	Fineness ·920. Value per oz. $19·01.	Weight Washed Gold. 4lb. sample qrtz. 6lb. ,, gravel.	Fineness ·780. Value per oz. $16·12	Fineness ·830. Value per oz. $17·15.	Fineness ·875. Value per oz. $18·08	Fineness ·920. Value per oz. $19·01.
Grains.	$	$	$	$	$	$	$	$	$
5	83·97	89·36	94·20	99·05	·07	1·17	1·25	1·31	1·38
4	67·18	71·49	75·36	79·24	·06	1.00	1·07	1·13	1·18
3	50·38	53.61	56·52	59·43	·05	·84	·89	·94	·99
2	33·59	35·74	37·68	39·63	·04	·67	·71	·75	·79
1	16·79	17·87	18·84	19·81	·03	·50	·53	·56	·59
·9	15·11	16·08	16·95	17·82	·02	·33	·35	·37	·39
·8	13·43	14·29	15·07	15·84	·01	·16	·17	·18	·19
·7	11.75	12·51	13·19	13·86	·009	·15	·16	·17	·18
·6	10·07	10·73	11·30	11·88	·008	·13	·14	·15	·16
·5	8·40	8·93	9·42	9·90	·007	·11	·12	·13	·14
·4	6·71	7·14	7·53	7·92	·006	·10	·10	·11	·11
·3	5·03	5·36	5·65	5·94	·005	·08	·08	·09	·09
·2	3.36	3·57	3·76	3·96	·004	·06	·06	·07	·07
·1	1·68	1·78	1·88	1·98	·003	·05	·05	·05	·05
·09	1·51	1·60	1·69	1·78	·002	·03	·03	·03	·03
·08	1 34	1·42	1·50	1·58	·001	·01	·01	·01	·01

To determine the value of a cubic yard of gravel, pulverize and wash 60 lbs., and if this produces 1 grain the value of the gold being 780 fine, the value of 1 cubic yard would be 1·67, a result obtained by dividing the value in the table by ten. If 60 lbs. yields $1\frac{8}{10}$ grains, the fineness of the gold being 920, the value of the gold is $1·98 × ·03 = $2.01 per cubic yard. The Table is prepared on the supposition that 4 lbs. of quartz is one five-hundredth part of a ton of 2,000 lbs. 18 feet of gravel in bank will weigh 1 ton, and a cubic yard or 27 cubic feet will weigh 3,000 lbs. or $1\frac{1}{2}$ tons, and 60 lbs. being $\frac{1}{50}$ of the weight of a cubic yard, the weight of quartz to gravel is as 1 to 10.

PANNING TESTS.

(Supplementing Assays).

Number of sample.	Weight in lbs.	Result in grs.	Remarks.	Value per ton.		
				Ozs.	Dwts.	Grs.
			Averages			

PANNING TESTS—*continued.*

(Supplementing Assays).

Number of sample.	Weight in lbs.	Result in grs.	Remarks.	Value per ton.		
				Ozs.	Dwts.	Grs.
			Averages			

TABLES.

Table I.—DISTRIBUTION OF GOLD AND SILVER IN THE ORE.

Name of Mineral.	GOLD. Per ton.			SILVER. Per ton.			REMARKS. (Colour and general character.)
	ozs.	dwts.	grs.	ozs.	dwts.	grs.	
TOTAL							

Table II.—SIZING TEST.

Per cent. in Weight.	Passing through Screen. No.	Remaining on Screen. No.	Assay Value per ton. Ozs.	Dwt.	Grs.

Table III.—POWER FOR A.....MILL.

Description of Machine.	Horse-power.

Table IV.—WEAR OF SHOES AND DIES.

Name of Mill.	Shoe or Die.	Metal.	Weight.		Ore crushed during time of service.	Metal worn per ton of ore crushed.	Cost of the metal per lb.	Value of the scrap.	Cost per ton of ore crushed.	Total cost per ton of ore crushed, for both shoe and die.
			New.	Worn out.						
			lbs.	lbs.	Tons.	Ozs.	Pence.	Pence.	Pence.	Pence.

Table V.—TABLE OF SCREEN SIZES.

No. of Needle.	Corresponding Mesh.	Width of Slot.		Gauge of Russia Iron.	Thickness.	Thickness of Iron. American Gauge.	Weight per Sheet.	Weight per sq. ft.	Burred Vertical Slots.		Plain Diagonal Slots.		Area of Slots ⅛in. long.	Punched Screens.		
									No. of Slots per sq. in.	Area of discharge per sq. ft. of screen.	No. of Slots per sq. in.	Area of discharge per sq. ft. of screen.		Area of Holes.	No. of Holes per sq. in.	Area of discharge per sq. ft. of screen.
		Ins.	m. m.	No.	ins.	No.	lbs.	lbs.		sq. ins.		sq. ins.	sq. ins.	sq. ins.		sq. ins.
3	16	0·042	1·05	16	0·036	22⅝	13⅛	1.24	9·0	26·6	—	—	0·020 5	0·001 32	160	30·4
4	18	0·035	0·875	15	0·036	22⅝	13⅛	1·24	9·5	23·9	—	—	0·017 5	0·000 96	160	22·1
5	20	0·029	0·75	14	0·034	23¼	12½	1·15	9·5	19·8	12·0	25·0	0·014 5	0·000 66	200	19·0
6	25	0·027	0·675	13	0·029	24	11⅝	1·08	10·5	20·4	12·0	23·3	0·013 5	0·000 57	200	16·4
7	30	0·024	0·60	12	0·025	24½	10⅝	0·978	10·5	18·1	12·0	20·7	0·012	0·000 45	240	15·6
8	35	0·022	0·55	11	0·023	25	10	0·918	11·0	17·4	12·0	19·0	0·011	0·000 38	240	13·1
9	40	0·020	0·50	10	0·020	26	9	0·827	11·0	15·8	12·0	17·3	0·010	0·000 31	300	13·4
10	50	0·018	0·45	9	0·018	27	8	0·735	11·0	14·3	12·5	16·2	0·090	0·000 25	300	10·8
11	55	0·016	0·413	8	0·016	28	7½	0·666	11·0	12·7	12·5	14·4	0·080	0·000 20	360	10·4
12	60	0·015	0·375	8	0·016	28	7¼	0·666	11·0	11·9	12·5	13·5	0·075	0·000 18	360	9·3

Table Ya.—WOVEN WIRE SCREENS.*

Mesh Number.	Number of Meshes per square inch.	Gauge of Wire.	Thickness of Wire.	Width of Mesh.		Area of each Mesh.	Discharge Area per square foot of screen.
				Inches.	Millimetres.	square inch.	square inch.
12	144	22 B.W.G.	0·028	0·055	1·39	0·003 03	62·8
14	196	24	0·022	0·049	1·24	0·002 40	67·8
16	256	25	0·020	0·042	1·06	0·001 76	65·1
18	324	26	0·018	0·037	0·93	0·001 37	63·9
20	400	28	0·014 8	0·035	0.88	0·001 23	70·6
22	484	29	0·013 6	0·032	0·81	0·001 02	71·4
24	576	31	0·011 6	0·030	0·76	0·000 90	74·6
27	729	33	0·010 0	0·027	0·68	0·000 73	76·5
30	900	34	0·009 2	0·024	0·61	0·000 58	74·7
32	1,024	34	0·009 2	0·022	0·55	0·000 48	71·4
35	1,225	35	0·008 4	0·020	0·50	0·000 40	70·6
40	1,600	36	0·007 6	0·017	0·43	0·000 29	66·6
45	2,025	37	0·006 8	0·015	0·38	0·000 23	65·6
50	2,500	37	0·006 8	0·013	0·33	0·000 17	60·8
55	3,025	37	0·006 8	0·011	0·28	0·000 12	52·7
60	3,600	37	0·006 8	0·010	0·25	0·000 10	51·8

* From a Table by Henry Louis in "Gold Milling," p. 128.

Table VI.—WEAR OF SCREENS.

Name of Mill.	Description of Screen.	Mesh.	Wear in Days.	Tons Crushed.

Table VII.—AMALGAMATION OF..... TONS OF CONCENTRATES.

	Assay Value per Ton.			Total Contents based on Assay of each Pan Charge.			Percentage of Extraction.	Loss of Mercury per Ton.
	Gold. ozs. dwts. gr.	Silver. ozs. dwts. gr.	Total. ozs. dwts. grs.	Gold. ozs. dwts. grs.	Silver. ozs. dwts. grs.	Total. ozs. dwts. grs.	By Assay.	lbs.
Concentrates ...								
Tailings								
Assay difference ..								
Actual Bullion Returns ...	Actually extracted per ton of ore.						Actual Extraction.	
	Actually contained in tailings per ton of ore.							

Table VIII.—GOLD MILLING COSTS.

Locality where situated .....

Name of Mill .....

No. of Stamps .....

Year in which return was made .....

Time crushing lasted .....

Tons crushed .....

		£	s.	d.
Labour, per ton, cost	*Rock-breaker*			
	Mill			
	Concentration			
Material cost				
Carried forward				

		£	s.	d.
Brought forward				
Fuel, cost				
Repairs and Maintenance, cost				
Transport, cost				
Water				
Lighting				
Assaying				
Total cost per ton, using as motive power	*Water*			
	Steam			
	Water and Steam			
	Electrical power			

Table IX.—WAGES.

Name of Mill.....

Locality.....

Capacity and Class of Mill or Works.....

No. of Men.	Occupation.	Length of Shift. Hours.	Wages per Shift. s.	d.

Table X.—GOLD MILL RETURNS.

District.	Average contents of the ore.	Average Milling Cost.	Average number of Stamps.	Weight of Stamps.	No. of Drops per minute.	Height of Drop.	Depth of Discharge.	Crushing capacity per Stamp.	Capacity of Mill per 24 hours.	Variety of Screen.	Number of holes per square inch.	Wear in days.	Percentage of Concentrates.	Average gold contents.	Retort percentage.	Fineness of Bullion.	Loss of Mercury per ton of Ore.	Consumption of water per stamp per Mine.	Total Consumption of water in the Mill.	Remarks.
	dwts.	s. d.		lbs.		Ins.	Ins.	Tons.	Tons.			Days.	P.cnt.	Oz.dts.	P.cnt.	Per 1000.	Dwts.	Gals.	Gals.	

Table XI.—GOLD SAVING.

Gold Percentage.				Silver Percentage.		
ozs.	dwts.	grs.		ozs.	dwts.	grs.
			Saved by Direct Amalgamation			
			Saved by Concentation			
			Saved by Pan or other Method			
Total ...				Total ...		

Table XII.—TRIAL CRUSHING.—RESULTS.

———	Total Gold contents calculated by assay.			Total Gold contents by estimate.			Total Gold actually obtained or accounted for.			
..... *tons of ore assaying* *ozs.* ..... *dwts.* ..... *grs. per ton contain* X	Ozs.	dwts.	grs.	Ozs.	dwts.	grs.	Ozs.	dwts.	grs.	
Gold obtained from stamp boxes										
Gold in ore discharged from the battery										
Gold obtained from copper plates										
Gold in the pulp after passing over the plates										
Gold obtained from "wells"										
Gold in the pulp after passing the "wells"	B									
Gold obtained from pans										A
Gold in sludge (pan tailings)										A
Gold obtained from settlers or other gold saving machines ...										A
Gold in settlings in catch-pits										A
Gold in tailings of concentrators										A
Gold intailings of settling pits and unaccounted for										A
							Y			

NOTE.—The sum of the results marked A should agree with the Assay B.
The Assay X should correspond with the total result Y.

The second column is filled in by deducting the Gold actually obtained, in the different steps of the process, from the total Gold contents of the ore as shown by the preceding assay, and the results estimated in this way should agree with the corresponding assay calculation.

Table XIII.—AMALGAM SAVING.

Weight.	Representing per cent.	—	Retorted.	Representing per cent.
Ozs. dwts.			Ozs. dwts.	
		Caught in the battery		
		Caught on plates outside		
		Caught in wells or ripples		
		Caught in Mercury traps		
		Caught on concentrators		
		Caught in pans, barrels or other appliances		
TOTAL ...		Total weight of base bullion		

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Table XIV.—CONSUMPTION OF MERCURY.

Name of Mill.	Loss Per Ton of Ore.			Arrangement of "Plates" or other Amalgam Savers.
	dwts.	dwts.	dwts.	
		to	*average*	
		"	"	
		"	"	
		"	"	
		"	"	
		"	"	

Table XV.—HUNTINGTON MILL.

—	Gross Cost. £	s.	d.	Cost per ton. s.	d
Labour of Tending and Feeding, Cleaning-up, and Superintendence					
Water for Mills and Rock-breaker					
Shoes					
Dies					
Caps, Scrapers, and Bolts					
Renewals of Working Parts					
Mercury					
Oil (illuminating and lubricating) for Mills and Breaker					
Depreciation					
Cost of Milling per ton					
Labour at Breaker					
Wear and Tear at Breaker					
Total cost per ton					

Table XVI.—BARREL CHLORINATION.—*Quantity treated* ..... *tons in* ..... *days* ..... *hrs. Extraction* ..... .%

BREAKING AND ROASTING.....Tons of Ore.

—	Gross Cost.	Cost per Ton.
	£ s. d.	s. d.
Labour.....men @..... =		
Fuel.....cords @..... =		
Salt		
Water for boiler		
Light		
Repairs		
Total cost *ex* redemption and interest ...		

CHLORINATING.....Tons of Ore.

—	Gross Cost.	Cost per Ton.
	£ s. d.	s. d.
Labourers.....men @..... =		
Chlorinators.....men @..... =		
Bleaching Powder .....lbs. @.....=		
Sulph: Acid ..... lbs. @..... =		
Repairs, wear and tear ... ... =		
Power ... ... =		
Extras ... ... =		

Table XVII.—VAT CHLORINATION.—*Quantity treated* ..... *tons in* ..... *days* ..... *hrs.* ..... *Extraction* ..... %

—	Gross cost.	Cost per ton.
	£ s. d.	£ s. d.
LABOUR:—		
Foremen		
Engineers and Foremen ...		
Gas Generator		
Salters		
Floormen		
Roasters		
Carmen		
Carpenters		
Labourers (white)		
„ (native)		
Teamsters		
Total cost ex interest and redemption		

—	Gross cost.	Cost per ton.
	£ s. d.	£ s. d.
SUPPLIES:—		
Acid		
Wood		
Coal		
Furnace Supplies		
Manganese		
Sulphate of Iron		
Salt		
Pipe		
Generator Fittings		
Leaching Tanks		
Miscellaneous		
Repair a/c		
Light a/c		
Haulage a/c		
Extras		

Table XIXa.—CYANIDE PROCESS.—*continued.*

	Gold. Ozs. Dwts.	Silver. Ozs. Dwts.	Remarks.
Assay of tailings (per ton)			
„ leached tailings			
Extraction called for			
„ obtained			
„ „ (per cent.)			
	Gold. £ s. d.	Silver. £ s. d.	
Value of tailings (per ton)			
Extraction value obtained (per ton) ...			
Average fineness of bullion (per 1,000) ...			
„ value of „ (per oz.) ...			

Table XIXb.—CYANIDE PROCESS—SUPPLIES CONSUMED.—*continued.*

	lbs.	Gross Cost. £ s. d.	lbs. per Ton.	Cost per Ton.
Cyanide				
Zinc				
Lime				
Sulphuric Acid				
Wood (Cords)				
Miscellaneous				
Totals				

Table XIXc.—CYANIDE PROCESS—COST OF TREATMENT—*continued.*

	Gross Cost. £ s. d.	Cost per Ton. £ s. d.
Labour		
Hauling		
Chemicals		
Supplies		
Miscellaneous		
TOTALS		

VALUE OF BULLION PRODUCTS.

	Gold. £ s. d.	Silver. £ s. d.	Total. £ s. d.
Bar bullion			
Precipitate shipped			
Slag „			

Table XX.—ORDINARY LIXIVIATION.—*Quantity treated* ..... *tons in* .....

Percentage of Extraction = ... *gross cost.*

		Per Ton.		
Roasting Labour:— No. of Men.	£ s. d.	£	s.	d
.....Rock-breaker, Rolls or Battery ... ... @ ..... per shift =				
.....Foreman—Roasters ... ... @ ..... ,, =				
.....Helpers ... ... @ ..... ,, =				
.....Wood Carriers and Ore Wheelers ... @ ..... ,, =				
.....Carmen for Raw Ore Charges ... ... @ ..... ,, =				
Materials:—				
% Salt..... lbs. ... ... @ ..... per lb. =				
Cords—Wood (Roasting) ... ... @ ..... per cord =				
Do. (Steam Power) ... ... @ ..... ,, =				
Oil, Light, Tools, etc.				
Repairs				
Management Office, Assay Office, etc.				
Total				

Table XXa.—ORDINARY LIXIVIATION.—*continued.*

LEACHING :—	Gross Cost. £	s.	d.	Per Ton. £	s.	d.
No. of Men.						
.....Charging and discharging Vats						
.....Leachers @ per shift						
.....Man preparing Calcium Sulphide						
.....Man roasting Precipitate...						
Sulphur ..... lbs. @ ... per lb. = ...						
Lime ..... lbs. @ per lb. = ...						
Wood for roasting Precipitate...						
Management Office, Mechanics' Assay Office						
Oil, Light, Fitters, Tools, etc.						
Pumping Charges						
Total, ex Interest and Depreciation						

Table XXI.—TIME TAKEN IN ORDINARY LEACHING.

	Hours.	Minutes.
Charging		
Base-metal Leaching		
Expelling the Water with Solution		
Silver Leaching		
Expelling the Solution with Water		
Total		

Table XXII.—TIME TAKEN IN TROUGH LIXIVIATION.

—	Hours.	Minutes.
Charging and Base-metal Leaching		
Draining Wash Water from top of Ore		
Expelling Base-metal Solution with Water		
Expelling the Water with Hyphosulphate Solution		
Silver Leaching		
Draining Solution from top of Ore		
Expelling the Solution with Water		

Table XXIII.—WORKING RESULTS OBTAINED IN ROASTING AND ORDINARY LIXIVIATION.

No of Furnace.	Year.	Month.	Day.	Per cent. of Salt used	Value of raw ore.	Value of raw ore containing salt.	No of tank charged.	Value of roasted ore.	Value after leaching in laboratory.	Per cent. of chlorination when ore left furnace.	Value of vat tailings.	Per cent. of actual chlorination calculated from vat tailings	Loss of weight the ore sustained in roasting.	Loss of silver by volatilization.	Loss of silver in tailings.	Per cent. of chlorination gained in the vats.	No. of ozs. of silver extracted per ton.	Per cent. of actual silver extraction.	Remarks.
					ozs. per ton.	ozs. per ton.		ozs per ton.	ozs. per ton.	per cent	ozs. per ton.	per cent	per cent	per cent	per cent	per cent	ozs. per ton.	per cent	
Averages:																			

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Table XXIV.—ORDINARY LIXIVIATION (Working Details.)

Quantity of water required for base metal leaching and sluicing per ton ... ... gals.

Quantity of hypo-sulphite sol. which has to circulate for each ton of ore ... ... gals.

Time required to treat one tank-charge of ore ... ... hrs. ..... mins.

Total quantity of water required per 100 tons of ore per day ... ... gals.

Total quantity of hypo sol. required per 100 tons of ore per day ... ... gals.

Total quantity of copper sulphate or other solution required per 100 tons of ore per day ... ... gals.

Loss of silver in base metal leaching per ton of ore in fractions of an ounce ... ...

AVERAGE COMPOSITION OF THE ORE TREATED AS PER SAMPLE FROM CRUSHER:—

Carb. of lime	per cent.	Zinc	..... per cent.
Silica	,,	Lead	..... ,,
Iron	,,	Magnesia	..... ,,
Sulphur	,,	Alumina	..... ,,
Arsenic	,,	&c.	

Average composition of the roasted precipitate ... ...

Table XXV.—RUSSEL PROCESS.—*Quantity treated* ..... *tons in* .....

Percentage of Extraction.

LABOUR:—	No. of Workmen.		Working hours.			Gross Cost. £ s. d.	Cost Per Ton. £ s. d.
Engines and Boilers	.....	Engineers	... .	@.....	per shift =	.....	.....
„ „	.....	Foremen ...	... .	@.....	„ =	.....	.....
Ore house	.....	Rock breakers	... .	@.....	„ =	.....	.....
„	.....	Wheeling ore	... ...	@.....	„ =	.....	.....
Dry kilns	.....	Charging kilns	... .	@.....	„ =	.....	.....
„	.....	Discharging kilns	.....	@.....	„ =	.....	.....
„	.....	Firemen (tending salt kilns and rolls) ..	.....	@.....	„ =	.....	.....
Rolls	.....	Machinists	... .	@.....	„ =	.....	.....
Furnace	.....	Firemen ...	... .	@.....	„ =	.....	.....
Cooling floor ...	.....	Discharging, cooling, and charging vats	.....	@.....	„ =	.....	.....
Lixiviation ...	.....	Lixiviators	... .	@.....	„ =	.....	.....
„ ...	.....	Helpers ...	... .	@.....	„ =	.....	.....
Carried forward ...				Carried forward ...		.....	.....

Table XXVa.—RUSSEL PROCESS—*continued.*

LABOUR—*contd.*	No. of Workmen.		Working hours.		Gross Cost. £	s.	d.	Cost Per Ton. £	s.	d.
Brought forward ...	.....		Brought forward ...		.....			.....		
Lixiviation ...	.....	Precipitators ...	.....	@.....per shift =	.....			.....		
„ ...	.....	Firemen on boilers, pumps, etc.	.....	@..... „ =	.....			.....		
„ ...	.....	Handling sulphides	.....	@..... „ =	.....			.....		
Refinery	.....	Roasters & refiners	.....	@..... „ =	.....			.....		
Mill	.....	Night foreman ...	.....	@..... „ =	.....			.....		
„	.....	Machinist ...	.....	@..... „ =	.....			.....		
„	.....	Carpenter ...	.....	@..... „ =	.....			.....		
„	.....	Blacksmith ...	.....	@..... „ =	.....			.....		
„	.....	General helpers ...	.....	@..... „ =	.....			.....		
„	.....	Assayer's assistant	.....	@..... „ =	.....			.....		
„	.....	Blacksmith's help	.....	@..... „ =	.....			.....		
„	.....	Electrician ...	.....	@..... „ =	.....			.....		
„	.....	Book-keeper ...	.....	@..... „ =	.....			.....		
Carried forward ...			Carried forward ...							

Table XXVb.—RUSSEL PROCESS—*continued.*

LABOUR—*contd.*	No. of Workmen.		Working hours.		Gross Cost. £ s. d.	Cost Per Ton. £ s. d.
Brought forward ...	.....		Brought forward ...		.....	.....
Mill	.....	Assayer	.....@.....	per shift =	.....	.....
„	.....	Head metallurgist	.....@.....	„ =	.....	.....
„	.....	Men and team hauling wood	.....@.....	„ =	.....	.....
Total ...				...	.....	.....

FUEL:—	Cords of wood.		Tons of coal.			
Engine and boilers ...	.....@..	.....per cord	@.....	per ton	.....	.....
Boiler lixiviation house	.....@.....	„	@.....	„	.....	.....
Ore and salt kilns ...	.....@.....	„	@.....	„	.....	.....
Furnace	.....@.....	„	@.....	„	.....	.....
Sulphide refinery ...	.....@.....	„	@.....	„	.....	.....
Totals { Amount ...				...	.....	.....
Value ...				...		

Table XXVc.—RUSSEL PROCESS—*continued.*

	£	s.	d.	£	s.	d.
CHEMICALS :—						
Copper sulphate ... ...lbs. @ ....per lb. ...						
Sodium hyposulphite ... . „ @ ..... „ ...						
Caustic soda ... ... „ @ ..... „ ...						
Sulphur ... ... „ @ ..... „ ...						
Sulphuric acid ... ... „ @ ..... „ ...						
Soda ash ... ... „ @ ..... „ ...						
Lime ... ... „ @ ..... „ ...						
...						
MATERIALS AND SUPPLIES						
LIGHT						
Total cost *ex* interest and depreciation						

Table XXVI.—GRINDING, MILLING *Quantity treated* ..... *tons in* ..... *days* ..... *hours.*

No. of Pans employed ..... *Percentage of Extraction* = ...

	Gross Cost. £ s. d.	Cost per Pan. £ s. d.
Wages per Month		
Wood		
Mercury		
Renewals and Repairs, Castings, Wear of Belts, etc.		
Handling Sludge		
Oil and Chemicals		
Ex Redemption and Interest ..... Total cost = ...		

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Cost per pan ..... *per day.*

Capacity of each pan ..... *(dry weight) of* { *Ore* ..... *or* *Concentrates* .....

Percentage of pyrites in the concentrates .....

Assay of sludge after first grinding ..... *After second grinding* .....

Interest on a capital outlay of £ ..... *at* % *on a total of* ..... *tons treated per annum* = ... *per ton*

Table XXVII.—MODIFIED REES RIVER PROCESS—*Quantity treated ..... tons, in ..... days ..... hours.*

Percentage of Extraction = ...

	Gross Cost. £	s.	d.	Per Ton. £	s.	d.
Labour:—						
Supt. and Assayer @ .....per shift						
Mechanic ... „ ..... „						
Carpenter ... „ ..... „						
Engineers ... „ ..... „						
Rock Brakesmen „ ..... „						
Kiln Attendant „ ..... „						
Battery Feeders „ ..... „						
Pan Men ... „ ..... „						
Retorter ... „ ..... „						
Supplies:—						
Salt ..... lbs. @.....						
Bluestone..... lbs. @.....						
Wood ..... cords @.....						
Mercury ..... lbs. @.....						
Repairs						
Chemicals and Assay Materials						
Light and Incidentals						
Hauling to Mill						
Total ex interest and redemption						

Table XXVIII.—WASHOE PROCESS.— *Quantity treated* ..... *tons, in* ..... *days* ..... *hrs.*

Percentage of Extraction = ...

	Gross Cost. £	s.	d.	Per Ton. £	s.	d.
Labour:—						
Supt. and Assaying @ .....per shift						
Crushing ... „ ..... „						
Amalgamating „ ..... „						
Power Pumps, etc. „ ..... „						
Foremen ... „ ..... „						
Tailings Pits „ ..... „						
Supplies—Fuel:—						
Chemicals and Mercury						
Lubrication						
Illumination						
Castings						
Supplies (Assay, etc.)						
Total ex interest and redemption						

Table XXIX.—ROASTING, MILLING.—*Quantity treated* ..... *tons in* ..... *days* ..... *hrs.*

Percentage of Extraction =.....

No. of Men.	Occupation.	Gross Cost. £ s. d.	Per Ton. £ s. d.
	Labour:—		
	Foreman @.....per shift		
	Assayer ,, ... ,, ...		
	Machinists ,, ... ,, ...		
	Carpenters ,, ... ,, ...		
	Blacksmiths ,, ... ,, ...		
	Engine-drivers ,, ... ,, ...		
	Firemen ,, ... ,, ...		
	Drying-floor ,, ... ,, ...		
	Battery men ,, ... ,, ...		
	Roasters ,, ... ,, ...		
	Cooling-floor men ,, ... ,, ...		
	Carmen .. ,, ... ,, ...		
	Amalgamators ,, ... ,, ...		
	Retorter ,, ... ,, ...		
	Melter . ,, ... ,, ...		
	Labourers ,, ... ,, ...		
	Watchmen ,, ... ,, ...		
	Ore-floor men ,, ... ,, ...		
	Clerks ... ,, ... ,, ...		
	Total		

Table XXIXa.—ROASTING, MILLING.—*Continued.*

		Gross Cost.			Per Ton.		
Supplies:—		£	s.	d.	£	s.	d.
Salt ...	tons @ = ...						
Quicksilver ...	lbs. @ = ...						
Wood ...	cords @ = ...						
Coals ...	tons @ = ...						
Castings	... ...						
Oil and waste	... ...						
Sundries, chemicals, etc. ...	... ...						
Water	... ...						
Haulage	... ...						
Charcoal, assaying and melting...	... ...						
Total ex interest and Redemption ...	... ...						

Table XXX.—SILVER TAILINGS MILL.—*Quantity treated ..... tons in ..... hrs. ..... days.*

Percentage of Extraction= .....

	Gross Cost.			Cost per Ton.		
	£	s.	d.	£	s.	d.
Preparing and Hauling						
Milling:—						
Labour						
Mercury lost						
Salt						
Sulphate of Copper						
Fuel						
Castings						
General Expenses						
Total						

Table XXXI.—PATIO PROCESS.

	Cost Per Ton. £	s.	d.
Breaking, Grinding and Cost of Tools			
Amalgamator's Wages			
Scraping Tahonas			
Carrying and Washing Scrapings			
Concentrating Tailings of Scrapings			
Carrying Slime from Tahona to Patio			
Mules and Keep			
Labour—Spreading Trilla and Mule Driving			
Labour—Washing Trilla			
Charcoal for Retorting Silver			
Concentrating Tailings of Trilla			
Materials:—	£	s.	d.
Salt ... ... lbs. @			
Sulp. of Copper ... . „			
Precipitated Copper ..... „			
Mercury ... ... „			
Total Cost			

Table XXXII.—SMELTING.

Quantity of ore treated ..... *tons in* .....

Percentage of Extraction.

Labour. Department of works.	No. of Men.	Occupation	Per Shift.	Working Hours. @	Gross Cost.	Cost per ton.
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
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.....	.....	.....	.....	.....	.....	.....

Materials.	Quantity.	At per		
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

General Expenses.		
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

Table XXXIII.—COMPARATIVE STATEMENT.

Tabulated results of the treatment *of* ..... *tons of* ....., *at the* ..... *Works by the* ..... *process.*

Year.	Tons Crushed.	Assay Value.	Theoretical Extraction per cent.	Actual Extraction. per cent.	Cost per ton. £ s. d.
January					
February.....					
March					
April					
May					
June					
July					
August					
September ...					
October					
November.....					
December.....					
Totals ...					

Table XXXIV.—RESULTS BY DIFFERENT PROCESSES.

Process.	General Nature of Ore Treated.	Daily Capacity of Works.	Cost of Treatment per Ton.		Metal or Mineral saved.	Percentage of Saving effected.	
			Lowest.	Highest.		Lowest.	Highest.

Table XXXIVa.—MILL AMALGAMATION RESULTS.

Months.	No. of days worked.	Average No. of Mills worked daily.	Amount of Ore reduced.		Amalgam obtained.	Bar Gold Extracted.			Produce of Bar Gold.			Standard of Bar Gold in Thousandths.		Produce of Fine Gold per Ton of Ore.						Duty.	Mecury.		
			Wet Ore.	Dry Ore.					Per Ton.					Determined by Assay.			Extracted by the Mills.				Net Loss Incurred.	Loss per Ton.	
			Tons.	Tons.	Ozs.	Ozs	Dts	Gr	Ozs	Dts	Grs	Fine Gold.	Fine Silver.	Ozs	Dts	Grs	Ozs	Dts	Grs	Per Cent.	Ozs.	Ozs.	dwts.
Ttls. & Avgs.																							

Table—XXXV.—GENERAL SUMMARY OF RESULTS.

YEAR.	JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV	DEC.	REMARKS.	AVERAGE FOR THE YEAR.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.		Tons.
Amount of Ore treated ...														
Average amount per day ...														
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		£ s. d.
Cost per ton...														
Mining { Extraction ...														
Mining { Development...														
Mining { Transport ...														
Reduction { Milling or other treatment														
Management and General Expenses, Insurance, Taxes, Royalties, &c.														
Maintenance and Repairs ..														
Redemption of Capital { Mine ...														
Redemption of Capital { Plant ..														
Current Capital outlay ...														
Totals														

SUGGESTIONS TO PURCHASERS OF MINES.

1. When buying a mining property avoid ventures not open to the fullest investigation in all respects, including titles.

2. See that there are ample actual reserves of "ore in sight," or, at any rate, sufficient "probable reserves" to justify the purchase.

3. Consider carefully the past record of the mine, if it has one, and the district in which it is situated.

4. It is generally best to "bond" (under option of purchase), promising "prospects" sufficiently "opened up" to show they are likely to develope into mines, rather than to buy properties outright when *too fully* developed, which, in other words, are "worked out," and be careful to avoid staking everything on one property alone.

5. Secure a capable and experienced Directorate, Secretary and Consulting Engineers in London, as well as a "staff" of the highest efficiency obtainable for the work required at the mine.

6. Avoid "overcapitalizing" the property.

7. Provide ample "working capital" to carry out the scheme contemplated and estimated for by the engineer in charge, and let this bear as large a ratio to "nominal" capital as possible; it is highly imprudent to go to allotment unless a sufficient sum is subscribed or otherwise guaranteed to place the undertaking on a sound footing.

8. On technical matters select good experienced men, and confide in their judgment for the management and operation of the Mine.

9. Look closely into financial details, and make a point of being posted on the general business and development of the mine by insisting on proper monthly and annual returns being regularly rendered in a business-like shape.

10. Before works are erected decide on the process which will yield *most net profit*, and do not stint expense in erecting them properly, but before thinking of doing so, see that you possess a mine which will keep them supplied with ore.

11. If choice can be made between a rich pockety mine and a property with ample reserves of low grade but "pay ore," larger profits will generally result from acquiring a property of the latter kind, looking to quantity rather than by depending on "quality" for dividends.

12. "Exploration" and "development" should be kept well ahead of "extraction," and the monthly yields should be averaged as much as possible so as to avoid phenomenally rich crushings one month, followed by poor or irregular returns the next.

13. Set aside annually a fixed percentage of profits for renewals of machinery and depreciation of plant, and create a reserve fund for the "redemption of capital."

14. Pay *good* salaries and wages for good skilled work. Common labour at ordinary rates, and nothing for disloyal, incapable or neglectful service!

15. See that strict economy is always studied, but discriminate between true and fictitious economy.

16. Neither the gross cost of operations, nor payment of high or low wages are any real proofs whatever that either economy or extravagance obtains in the management of any particular mine, the measure of the one or of the other can only be

gauged by a comparison from month to month of the relative average cost of mining and milling per ton of ore extracted and treated at different mines, under parallel conditions, with approximately the same output. If under such circumstances the cost differs, it is advisable to ascertain where and why they do not correspond.

17. Secure if possible a mine in a new and progressive "mining camp" or district with rich and abundant ore, cheap transport, good climate, water power and timber, and where skilled labour and low priced "supplies" are obtainable.

18. Finally, extract the payable ore just as quickly as circumstances permit, and leave the balance for posterity.

With preliminary conservative estimates, which are the best guarantee of liberal working-profits, a gold mine, secured and operated on the above lines, will be found, not only a highly remunerative, but a very *safe* investment, run not as a "stock-gamble," but as a business. The two methods—by either of which money can be made—must be considered entirely apart:—

In the one case to make money you should take advantage of every favourable turn of the market to buy or sell.

In the other you should hold your shares firm, regardless of market fluctuations. In either case shares which may be worth buying at 1s. may however spell ruin to the purchaser who buys them at £1.

Lord Kelvin, in his Presidential address to the British Association in Edinburgh, said:—"Nearly all the grandest discoveries of science had been but the rewards of accurate measurement and patient, long-continued labour in the sifting of numerical results," and it must be admitted that in the pursuit of mining a wide field is open to the engineer, not only in sifting and recording facts, but more particularly in accurately determining their value with a view to apply statistics of this kind to commercial ends.

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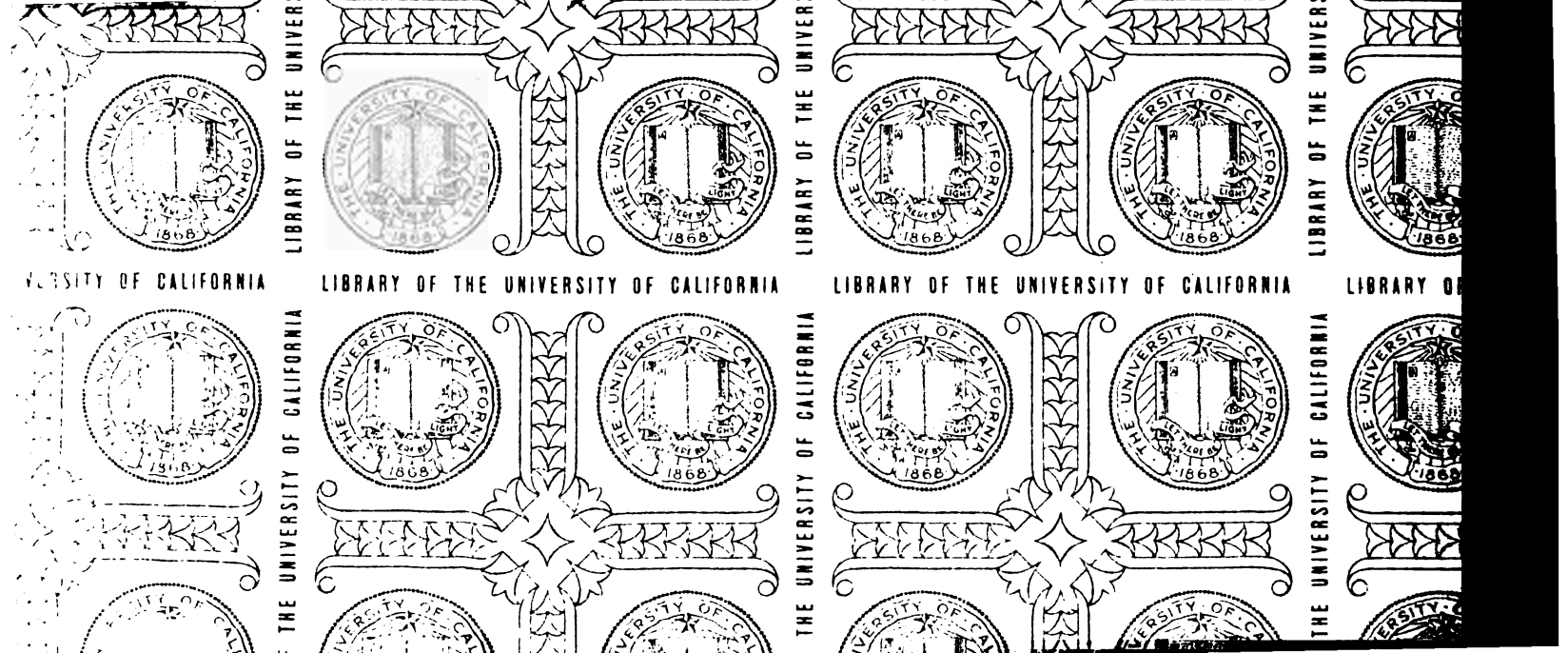
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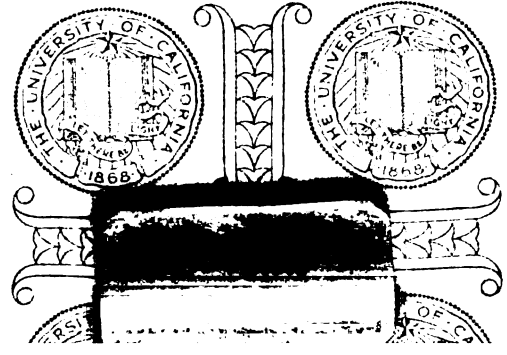
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